SURGERY, GYNECOLOGY AND OBSTETRICS

AN INTERNATIONAL MAGAZINE, PUBLISHED MONTHLY

VOLUME VII OCTOBER, 1908 NUMBER 4

THE PRINCIPLES ON WHICH THE SUCCESS OF SURGICAL TREATMENT OF RETRODISPLACEMENTS OF THE UTERUS DEPENDS[1]

BY R. C. COFFEY, M. D., PORTLAND, OREGON

MUCH study and much space have been devoted to the development and description of a multitude of technical methods of operation for uterine displacement. Some have been found wanting in results, while other methods have been successful as success goes in surgical cases. The question then is, What methods have been successful, and why have they been successful? Are there general principles back of and common to all the successful methods? In treating displacements of the uterus, it has apparently in the past been assumed that the so-called true ligaments of the uterus were the real suspensory supports, while the peritoneum forming the broad has been considered as the false ligament. Some, in studying the nature of the so-called true ligaments, have found them wanting in power, and have therefore resorted to that somewhat uncertain force spoken of as intraabdominal pressure, while the older writers fully believed the perineum was the principal support until it was demonstrated that retrodisplacements occur in a large proportion of women who have never borne children. Nature in performing things nearly always uses a definite scheme. By studying embryology, I believe we can demonstrate that she has used a definite scheme in hanging the organs of the abdominal cavity. Therefore, I ask the readers to briefly review this phase of the subject of embryology with the hope of connecting it

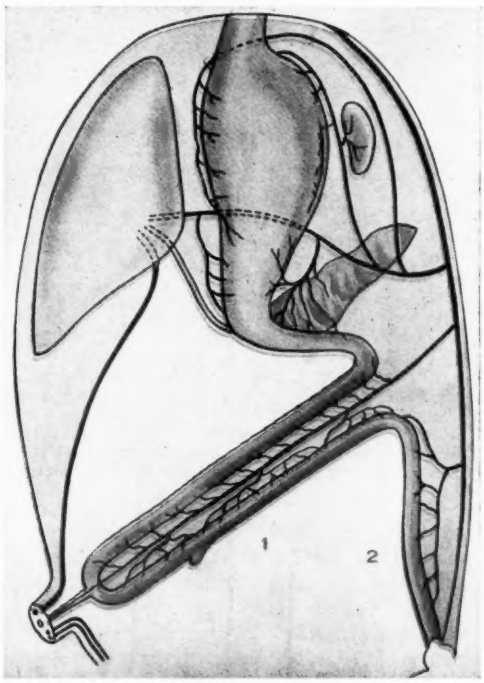


Fig. II. First stage of the development of the intestinal canal and the peritoneum seen from the side. (Diagrammatic.) From colon (1) the ascending and transverse colon will be formed, and from colon (2) the descending and sigmoid colons and the rectum. (Redrawn from Sobotta and McMurrich.)

[1]Read at a joint meeting of the Chicago Gynecological and the Chicago Surgical Societies, April 17, 1908.

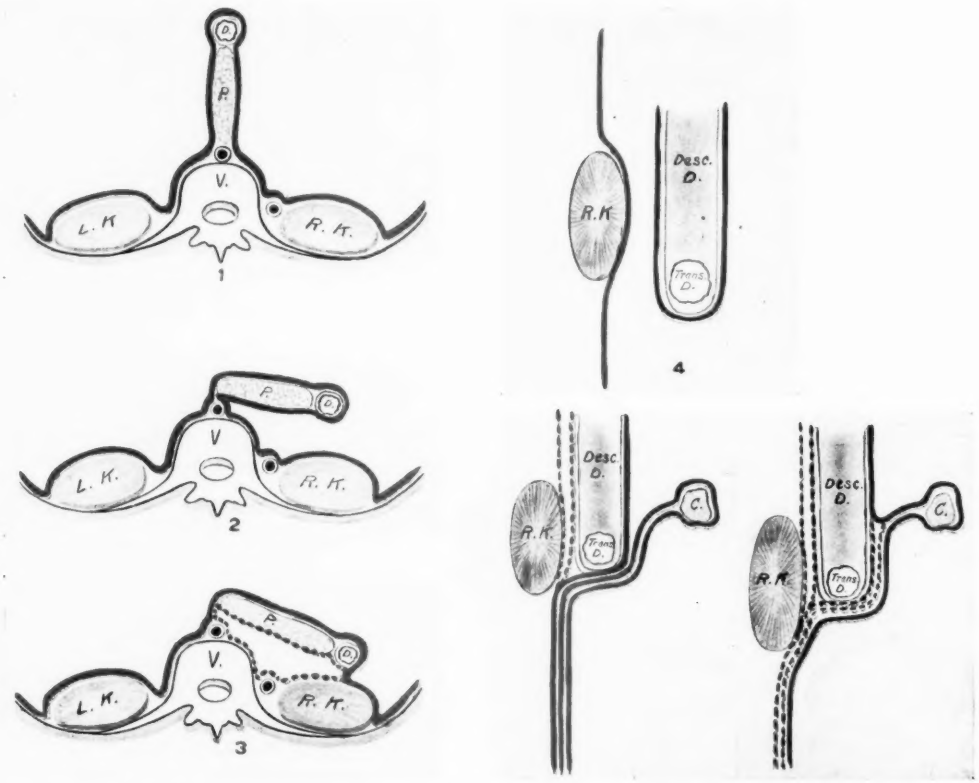


Fig. III. Key to diagram: *D.*, duodenum; *P.*, pancreas; *V.*, vertebra; *L. K.*, left kidney; *R. K.*, right kidney; *Desc. D.*, descending duodenum; *Trans. D.*, transverse duodenum; *C.*, colon.

(1) Free mesoduodenum in sagittal plane, including head of pancreas, between right and left layers. (2) Mesoduodenum folded to right; left leaf has become ventral; right dorsal, directed toward primitive prerenal parietal peritoneum. (3) Fixation of head of pancreas, and duodenum, under cover of secondary parietal peritoneum by adhesion of apposed surfaces of mesoduodenum and primitive parietal peritoneum. (4) Sagittal section of 1, 2, 3. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Redrawn from Huntington.)

up with the subject, and comparing nature's method of suspending abdominal organs with successful artificial methods which surgeons have produced.

Taking up the alimentary canal, we find that in the early fœtal development, it is a straight tube, lying between two parallel membranes which are layers of peritoneum extending across the body cavity from before backwards. That part of the two membranes back of this alimentary canal is the dorsal mesogastrium, while that in front is the ventral mesogastrium. Between the layers of the dorsal mesogastrium the spleen and pancreas develop, while between the layers of the ventral mesogastrium the liver develops. Owing to the great development of the muscular layers of the alimentary canal, it becomes too long and therefore has to curve in different directions to fit the cavity in which it is enclosed and the peritoneal fold of mesentery which holds it back, and in doing so, its position continues to change until the relations seen in the adult are acquired. This process is called rotation. In Fig. II, this rudimentary development has begun. The muscular devel-

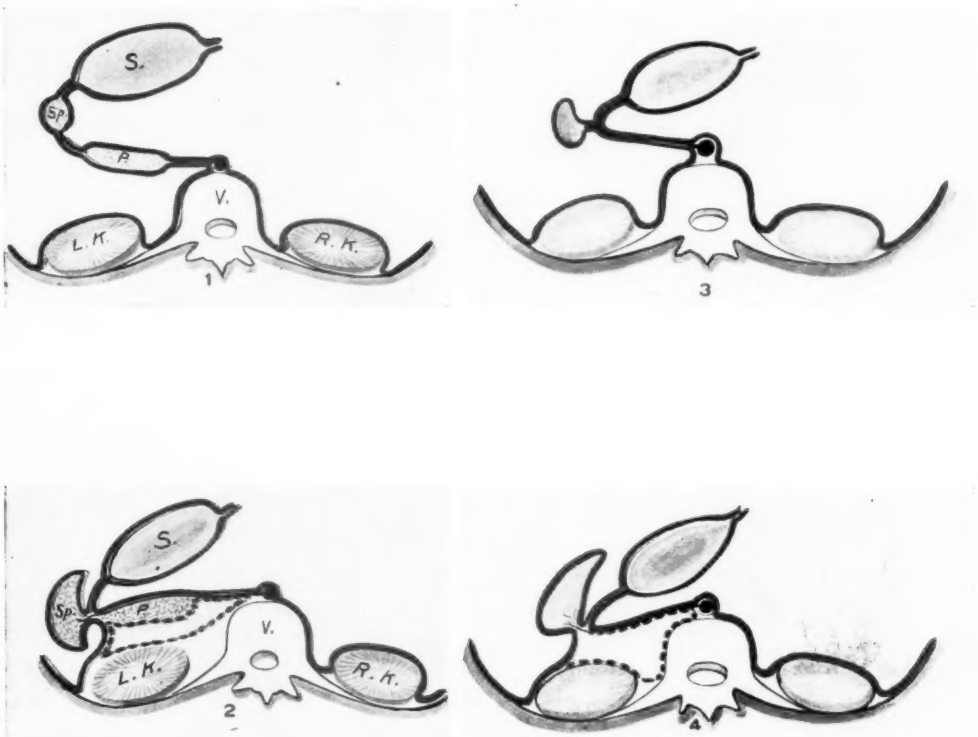


Fig. IV. Key to diagram: *S.*, stomach; *S. P.*, spleen; *P.*, pancreas; *L. K.*, left kidney; *R. K.*, right kidney; *V.*, vertebra. (Continous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.)

(1) Schematic transection of dorsal mesogastrium, pancreas, spleen, and stomach before adhesion to primitive parietal peritoneum. (2) After adhesion and formation of secondary line of transition between mesogastrium and parietal peritoneum (lienorenal ligament). (Redrawn from Huntington.) (3) Schematic transverse section of the abdomen, showing early stage of development of spleen from extreme left end of dorsal mesogastric pouch. (4) Schematic transverse section of the abdomen, showing later stage of development of spleen and arrangement of peritoneum after adhesion of dorsal layer of mesogastrium and primitive prerenal parietal peritoneum.

opment has caused the dorsal mesogastrium and mesentery to elongate in certain places. The omphalomesenteric duct still connects the intestine with the umbilical cord. Cæcum bidding off from intestine. In the next state after the view shown in this picture, the canal has so lengthened that the duodenum and head of the pancreas, which here shows but a slight curve, becomes longer and in the natural course of things, rotates to the right side (Fig. III 2), until it comes in contact with the parietal peritoneum covering the right kidney and the contiguous peritoneal surfaces adhere to each other (Fig. III 3). These membranes become absorbed, leaving only the fibrous elements of the peritoneum and thus the second part of the duodenum and head of the pancreas become fixed to the posterior wall (Fig. III 4). About the same time the stomach rotates in the opposite direction to the left side, carrying with it the bud of the spleen and tail of the pancreas (Fig. IV 1 and 3). The left layer of the dorsal mesogastrium, which includes the spleen, in the course of rotation comes in contact with the left kidney, and the parietal peritoneum of the left side, and the surfaces adhere to each other and become obliterated, leaving the pancreas retroperitoneal while the spleen

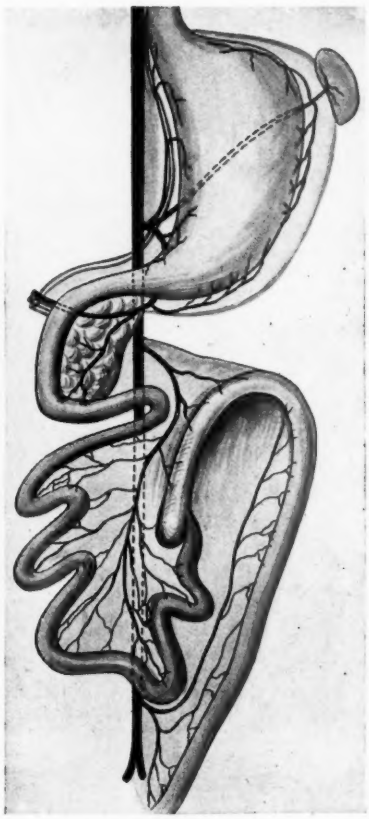


Fig. V. Second stage of the development of the intestinal canal and peritoneum seen from in front. (Diagrammatic.) The cæcum and large intestine, as shown in this picture, gradually move upward and to the opposite side, and then downward; and the small intestines turn underneath and are thrown to the opposite side as shown in Fig. VI. (Redrawn from Sobotta and McMurrich.)

remains in a pocket; thus, the spleen is suspended and fixed by the adhesion, blending, and obliteration of the left leaf of the dorsal mesogastrium and the left parietal peritoneum (Fig. IV 2 and 4). Next the omphalomesenteric duct which connects the small intestine and the umbilical cord is absorbed, freeing the intestine (Fig. V). The intestine is now rapidly growing and stretching its mesentery. The limitations of the mesentery or mesogastrium cause the large intestine which was primarily on the left side, to rotate upward and to the right and then downward, while the smaller intestine rotates to the opposite side shown in Figs. V and VI; thus the left layer of the dorsal mesogastrium forming the mesentery comes in contact with the duodenum, pancreas, and the parietal peritoneum on both sides, and adheres to the parietal peritoneum, and the two contiguous peritoneal surfaces blend, and finally obliterate, thus fixing the ascending and descending colon on the right and left side (Fig. VII 1 and 2) and the transverse across the abdomen covering the third portion of the duodenum and making it retroperitoneal (Fig. III 4). The layers of the transverse mesocolon are long and form a suspensory ligament for the colon (Fig. III 4). The dorsal mesogastrium in connection with the stomach (Figs.

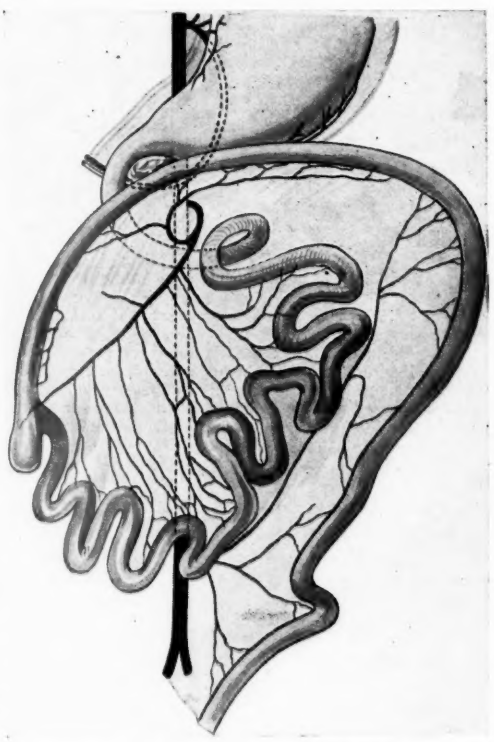
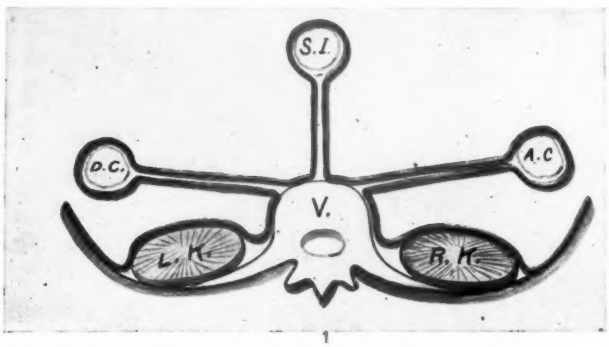
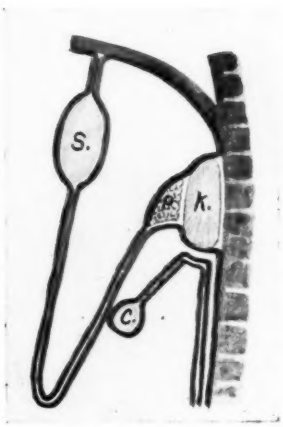
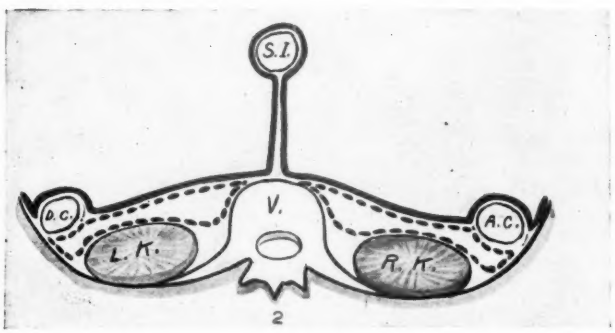


Fig. VI. Normal position of intestines after rotation showing how, by the process of rotation, the duodenum is thrown behind the mesentery of the transverse colon and thereby becomes retroperitoneal. (Redrawn from Sobotta and McMurrich.)







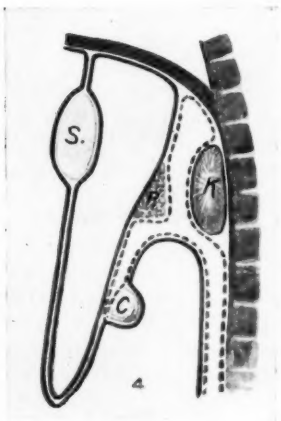


Fig. VII. Key to diagram: *S. I.*, small intestine; *D. C.*, descending colon; *A. C.*, ascending colon; *V.*, vertebra; *L. K.*, left kidney; *R. K.*, right kidney; *S.*, stomach; *C.*, colon; *P.*, pancreas; *K.*, kidney.

(1 and 2) Scheme showing peritoneal arrangement in transection of infracolic compartment of abdomen before and after fixation of ascending and descending colon. (3) Arrangement of great omentum as found in Macacus rhesus, shown without reference to areas of peritoneal obliteration. (4) Corresponding section of human adult peritoneum, showing along dotted lines, area of peritoneal adhesion. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Redrawn from Huntington.)

V and VI) continues to greatly elongate, forming the omental bursa which finally grows down over the large intestine and is at first loose (Fig. VII 3) but by constant contact its posterior or peritoneal layer adheres to the transverse colon, and the contiguous peritoneal surfaces adhere, blend, and obliterate, thus leaving the combination of the mesocolon and the posterior layer of the omentum as one membrane (Fig. VII 4). Later on in fœtal development, but sometimes not until later life, the contiguous layers of the omental bursa adhere, blend, and obliterate up to and above the transverse colon (Fig. VIII). Thus the colon is suspended from the lower border of the stomach by another ligament

called the gastro-colic ligament or gastro-colic omentum, while the omentum presents the appearance of a single layer of fat enclosed in peritoneum. The liver develops to a very large organ in the fœtus and at no time changes position, but fills out the space between the layers of the ventral mesogastrium which always remains as its principal ligament above and forms the gastro-hepatic ligament or lesser omentum below. Thus, all the ligaments of the abdominal cavity proper, are peritoneal folds which in most instances have been located by rotation and fixed by the adhesion, blending, and obliteration of contiguous peritoneal surfaces. While this may be true of embryological peritoneum, is it also true of the adult peritoneum? I have made many animal experiments both on dogs and hogs. If the mesentery is pursed as shown in Fig. IX the surfaces held together by the purse-string suture are so blended at the end of six weeks that it presents a practically smooth mesentery as shown in Fig. X. Suturing the omentum of an animal to the abdominal wall by the hammock operation shown in Fig. XI shows the results within six weeks depicted in Fig. XII, in which the layers of peritoneum and the omentum and abdominal wall are, as far as the eye can detect, perfectly blended, not only at the point of suture but between the sutures as well. After suturing the edge of the liver to the parietal peritoneum with catgut sutures, the parietal peritoneum becomes continuous with the covering of the liver and forms what is, as far as the eye can see, a blending and continuation of the peritoneal surfaces, and the ligaments are just as the other ligaments of the liver and while the catgut has absorbed, this new ligament was sufficient to hold the weight of the entire liver at the end of six weeks. (Fig. XIII.) The hammock operation shown in Fig. XI has been done on patients eighteen times by the writer with success in every case except two which were only partial as far as holding is concerned, due to congenital conditions. In one case, I had to open the abdomen six weeks after the hammock operation for another trouble and found that the omentum where it was attached had formed a solid wall across the abdomen, as shown in the specimen of the pig's omentum. A year later,

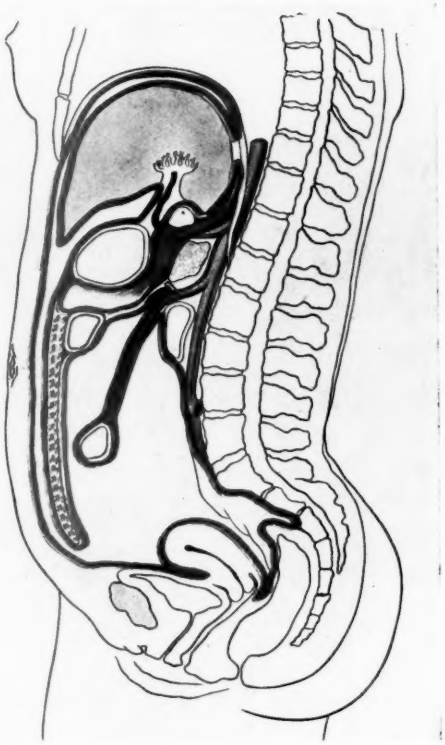


Fig. VIII. Normal arrangement of adult peritoneum shown by continuous red lines; obliteration of peritoneal areas of omental pouch shown by dotted red lines.

it was necessary to open the abdomen again and at this time I found the wall still solid and the stomach was not in view from below. Thus we find that macroscopically or clinically the suturing of two peritoneal surfaces together forms a ligament similar to those formed by nature in the embryological stage; but do these adhered peritoneal surfaces actually blend and become continuous? Barbat, in an extensive study of microscopical union, after intestinal anastomosis by the Murphy button and other methods, in which the peritoneal surfaces are turned in and brought together by sutures (Fig. XIV) and otherwise, found that within a few days the opposing peritoneal surfaces had lost their identity as membranes and the peritoneum became continuous, completely spanning the wound, as shown in Fig. XV. Gould,

Fig. IX. Shortening of a pig's mesentery.

in his work on Intestinal Surgery says: "The close approximation of two serous surfaces, which is characteristic of intestinal suturing results in a rapid exudation from the apposed surfaces. This exudation appears in a very few hours and hermetically seals the wound. Every coat of the bowel is soon penetrated by this exudate, rapidly destroying the endothelium on the outside of the bowel." Another striking example, and one which comes probably closer to the subject, is found in the descent of the testicle, which is drawn down through the inguinal canal bringing with it a covering of peritoneum. The pressure of the canal causes the peritoneal surfaces to adhere, blend, and obliterate as it is drawn through the ring, leaving the fibrous elements of the peritoneum as a part of the cord, and this fibrous cord is the ligament of the testicle, according to Sobatta. The surface of peritoneum around the exit of the cord becomes smooth and continuous. In case the canal is large, sufficient pressure is not made on the peritoneal surfaces and we have a congenital hernia.

It is a well-known fact among surgeons that the great majority of congenital herniæ may be cured by a well-applied truss which acts by pressure, holding the peritoneal surfaces together firmly enough that they adhere, blend, and obliterate the space. We have all had an opportunity to observe the more or less successful treatment of hernia by the traveling quack, who knows nothing of the anatomy or of science, but who is, nevertheless, empirically using a method which, though unsurgical, is not altogether unscientific. He injects his infusion of oak bark into the inguinal canal, using the single precaution not to penetrate the sac. The strong irritation of the oak bark produces a great reaction and swelling in the inguinal canal which holds the swelling under pressure and thereby holds the peritoneal surfaces so firmly together that they blend and obliterate, making a permanent cure in more than one-half of the cases. Huntington in

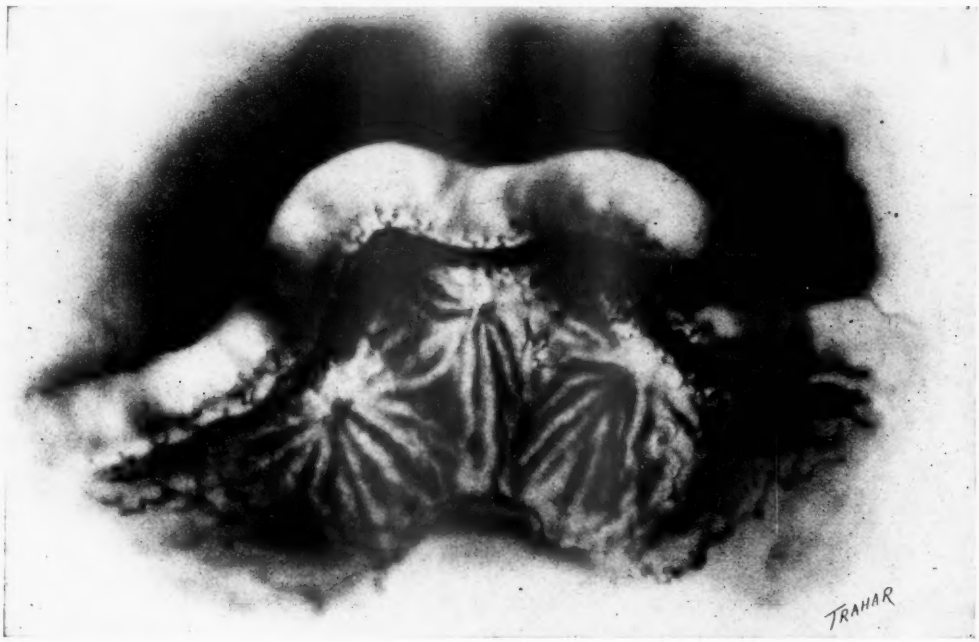


Fig. X. Mesentery of pig which was shortened six weeks before removal.

his remarkable book on the "ANATOMY OF THE PERITONEUM AND ABDOMEN" says:

"For the sake of clearness and brevity, all discussion of the theories of peritoneal development has been designedly omitted. The assumption of peritoneal adhesion, and consequent obliteration of serous areas, offers many advantages in considering the adult human abdominal cavity, especially from the standpoint of comparative anatomy. The same has consequently been adopted without reference to divergent views and theories."

Taking all of these evidences I think we are justified in establishing the following rule:

"*Two peritoneal surfaces brought together and held firmly in an aseptic state*, adhere, blend, and obliterate, and contiguous surfaces lose their endothelial covering becoming continuous at the point of peritoneal union."

Our future discussion of the various methods of suspension will be based on the assumption of the truth of this rule.

By the foregoing study of embryology, it will be noted that the ligaments supporting the various organs are purely folds of peritoneum. Many writers have therefore questioned the ability of the ligaments to hold the organs and have sought other theroetical reasons to account for the organs remaining in place. To those who question the strength of the peritoneal ligaments, I would suggest the study of ligaments in the slaughter house or in a coroner's morgue, when it will be found that there is no organ in the abdominal cavity which is not held by a ligament sufficient to hold from eight to fifteen times the weight of the organ. But for the sake of liberality in argument, let us admit that only one-eighth of the weight of the abdominal organs is held by these ligaments. I think the most skeptical will not deny that this one-eighth is an absolute essential to the maintaining of the normal positions of the organs, so that it matters not whether the organ is held entirely by the peritoneal ligaments or whether only one-eighth is held by them. The uterus is suspended by the peri-

Fig. XI. Suturing the omentum to the peritoneum of the abdominal wall to produce a hammock for suspension of the stomach.

toneum, as if it had been inserted from below upward, pushing before it the peritoneum, which becomes fixed to the anterior and posterior surfaces of the uterus, one fold coming in diagonally from the front and the other diagonally from behind, forming a triangle the apex of which is at the uterus. The peritoneum, except where it covers the diaphragm, is held to the abdominal wall by connective tissue which is loose enough to allow the sliding of the peri-

Fig. XII. Omentum of pig sutured to abdominal wall six weeks before removal.

toneum on the wall and thus producing what seems to be a stretching. This connective tissue is sufficiently strong to hold the peritoneum loosely in contact with the wall. Any wasting disease or aging which causes an absorption of this loose connective tissue predisposes to a displacement of various organs by allowing the peritoneum to pull away from the wall; thus we find a complete prolapse most common in those who are in their declining years and whose connective tissue, even under the skin, is much depleted. By this method of reasoning the suspension of the uterus is in harmony with all the other abdom-

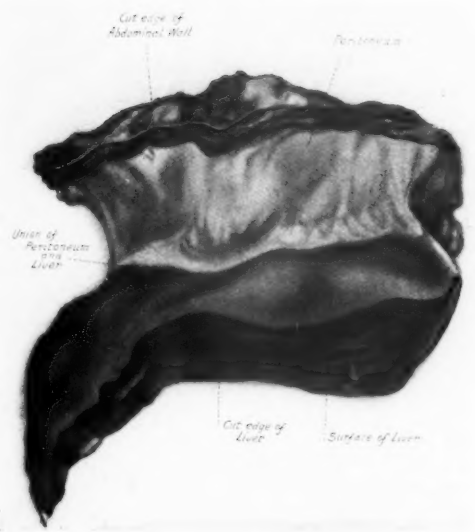


Fig. XIII. Specimen from a pig's liver which was sutured to abdominal wall six weeks before removal.

inal organs in that the peritoneum is a major factor, and that the peritoneum of the broad ligament is a true mesometrium just as the peritoneum is the mesocolon and the mesentery of the small intestines. It seems to me that the round ligament has been a stumbling block to many of our gynecologists. It looks like a ligament and is placed where a ligament ought to be to hold the uterus but its structure is not that of a ligament. Sobatta regards all of the so-called true ligaments of the uterus as a continuation of its musculature and an examination of the round ligament shows that in the vicinity of the uterus, where it is

Fig. XIV. Diagram showing approximation of peritoneal surfaces in intestinal sutures. (Modified from Gould.)

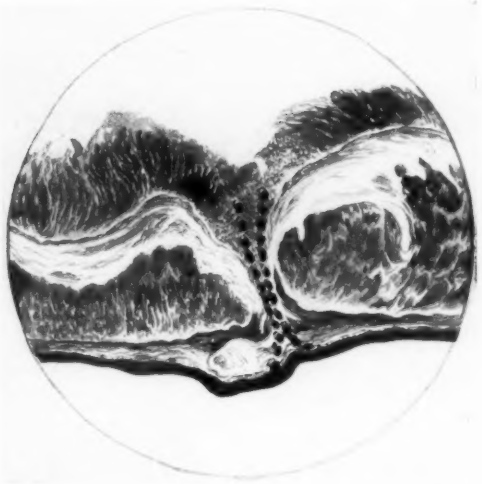


Fig. XV. Repair following intestinal union. (Dotted lines indicate obliterated areas.) (Modified from Barbat.)

thickest, it is composed solely of non-striated muscular fibers and connective tissue, while in the inguinal canal it receives some striated muscle fibers from the internal oblique and transversalis which frequently pass almost to the uterus. There is not a single thing in the structure of the round ligament which could lead us to believe that its function is that of continuous holding, for nowhere in the animal organism is a muscle called upon to do constant duty; moreover it is absolutely opposed to the known physiology of a muscular fiber. That the so-called ligaments of the uterus at times move the uterus to suit the position and conditions of the body, there can be no doubt, which fact taken into consideration with the histological structure of the round ligament leaves but little doubt that the round ligament is absolutely essential, not as a ligament, but as an active agent to poise the uterus across the pelvic outlet on its true ligament — (the broad ligament or mesometrium) which is inserted just below its middle. The broad ligament may be said to have an anterior and posterior fold. Underneath and parallel to the anterior fold the round ligament is located in the connective tissue. If, for any reason, the anterior fold of the broad ligament becomes too long, the tendency of the uterus is

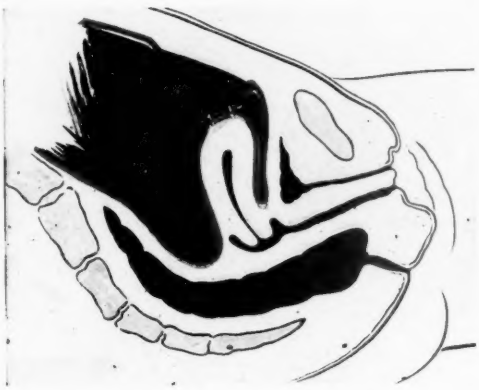


Fig. XVI. Kelly's ventrosuspension showing uterus sutured to loose parietal peritoneum. (Continuous red lines represent peritoneum.) (Diagrammatic.)

Fig. XVII. Kelly's ventrosuspension showing permanent ligament. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Diagrammatic.)

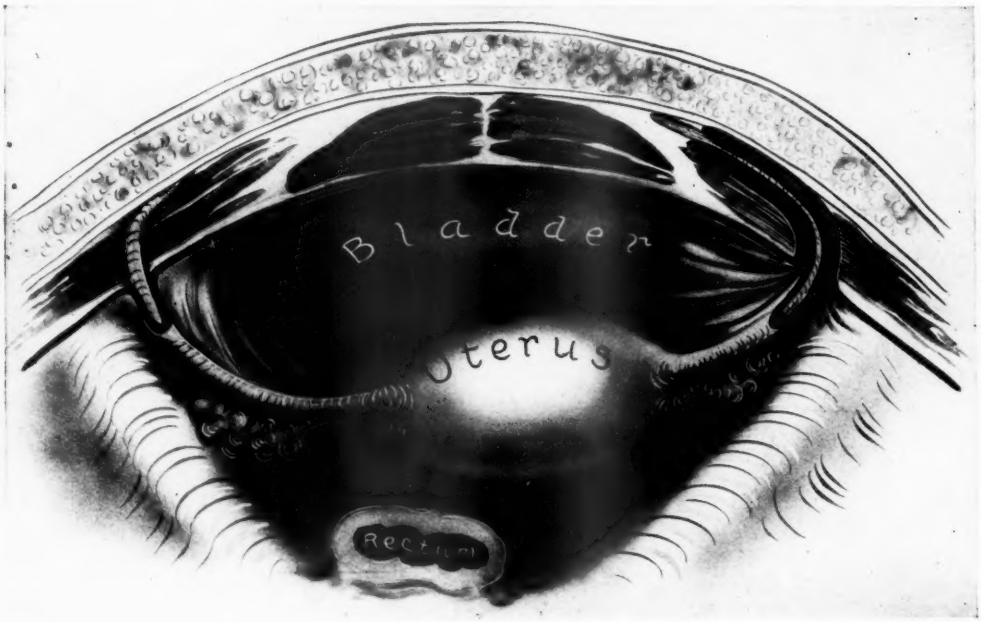


Fig. XVIII. Alexander's operation. Left round ligament undisturbed; right round ligament drawn out through inguinal canal with folds of peritoneum or broad ligament. (Continuous red lines represent peritoneum. (Semi-diagrammatic.)

Fig. XIX. Alexander's operation showing ligaments shortened. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Semi-diagrammatic.)

to sag backwards and downwards, putting the muscular fibers of the round ligament into constant action in trying to replace it and, as is always the case with a muscular fiber, it finally tires out and is unable to properly poise the uterus. On the other hand, if, by injury, one or both of the round ligaments are destroyed or crippled, the uterus has nothing to poise it, to meet the conditions and positions of the body; consequently, the uterus lies as a dead weight and soon stretches the connective tissue and drags down the broad ligament. It is well at this point to note that the round ligament is a separate structure from the peritoneum, and works independently. We are of the opinion that the anterior fold of the broad ligament is the proper ligament to shorten and shall attempt to prove that all successful operations have utilized the peritoneum of the anterior fold of the broad ligament as the principal agent and that the round ligament should under no circumstances be permanently fixed as it is neither a vestigial organ nor a ligament, but is an elastic muscle with a duty to perform and therefore should not be permanently crippled, for if the dead weight is taken away by shortening the broad ligament, the muscular fibers regain their tone by rest and again become useful as is exemplified in orthopedic surgery.

There are five types of operation described in the present literature which have been successful to a marked degree. 1. Those which suture the uterus to the anterior parietal peritoneum. 2. Those which expose the external inguinal ring and draw the round ligament with its covering of broad ligament peritoneum out and suture it to some of the external tissues or to its fellow of the opposite side. 3. Those in which an instrument is passed from a central abdominal incision between the layers of the abdominal wall to a point internal to the exit of the round ligament. The layers of

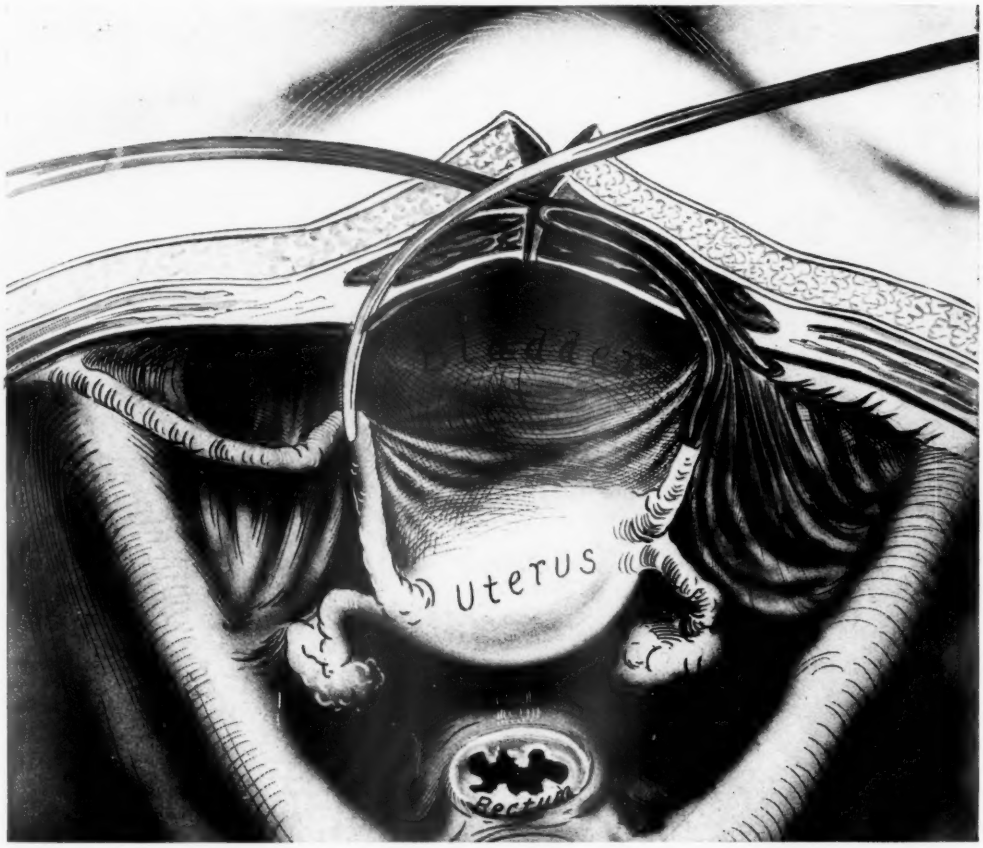


Fig. XX. Modified Gilliam operation. Left round ligament with broad ligament being drawn through the inner layers of the abdominal wall; right round ligament with folds of peritoneum drawn through tissues of the abdominal wall ready for suturing. (Continuous red lines represent peritoneum.) (Semi-diagrammatic.)

the abdominal wall and peritoneum are penetrated by the forceps, and the round ligament and the anterior fold of the broad ligament, which includes it, are drawn out through the puncture and sutured to the tissues of the abdominal wall or the fellow of the opposite side. 4. The type in which the broad ligament is punctured from behind by a forceps which passes beneath the ovary and tube and, after emerging through the anterior fold of the broad ligament, grasps the round ligament and the anterior fold of the broad ligament, which includes it, and draws them through the broad ligament, where they are sutured to the posterior surface of the uterus; 5. The type of operation in which the round ligament and the anterior fold of the broad ligament which includes it are folded on themselves and sutured.

Type No. 1 is commonly known as ventral suspension or ventral fixation, and while it had been suggested by previous surgeons, it was popularized in this country by Kelly, and abroad simultaneously by Olshausen. The typical operation and the one which has been most frequently done is the one described by Kelly and shown in the picture. It will be noted that the uterus is stitched to the loose

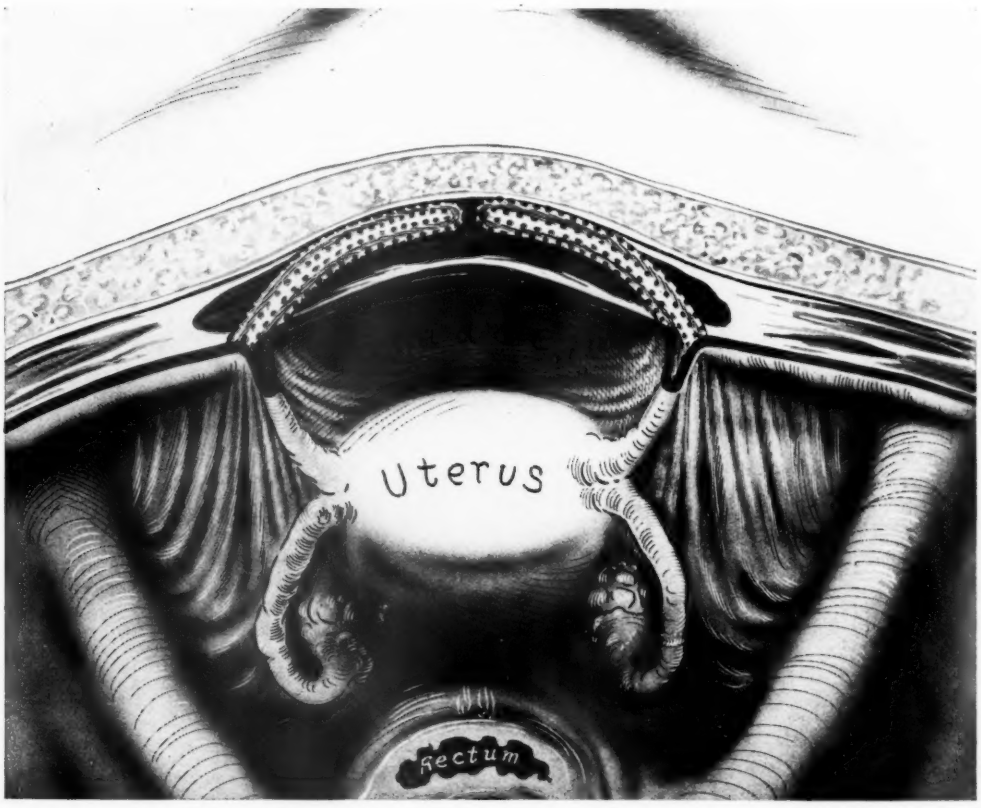


Fig. XXI. Modified Gilliam operation. Round and broad ligaments shortened, extra abdominal peritoneum obliterated. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Semidiagrammatic.)

peritoneum of the abdominal wall (Fig. XVI). Two sutures, which may be either catgut or silk, cause a blending of the peritoneal surfaces of the uterus and of the abdominal wall. The space is at once filled with an exudate that is soon replaced by connective tissue, which draws the peritoneum back in contact with the wall, thus spinning the fold of peritoneum out into a ligament extending from the abdominal wall to the uterus (Fig. XVII), and is anatomically the same as the one suspending the spleen in the embryological pictures (Fig. IV 2 and 4). It is useless to comment on the success of this operation, for it has probably been performed more times than any other intra-abdominal operation, with the exception of appendicitis, and with a comparatively small per cent in which the uterus ever freed itself and returned to its former place. When displacement has recurred it is usually found that the ligament has stretched out to a long, fine thread instead of severing. I wish here to call attention to the extremely small attachment which is used to hold up this very heavy organ. To those who have had occasion to see one of these ligaments through an abdominal incision several years after the operation, it is not necessary to explain that this ligament is strong enough to hold several times the weight of the uterus. This operation has the advantages of being simple and easy to perform and is nearly always successful as to holding. It

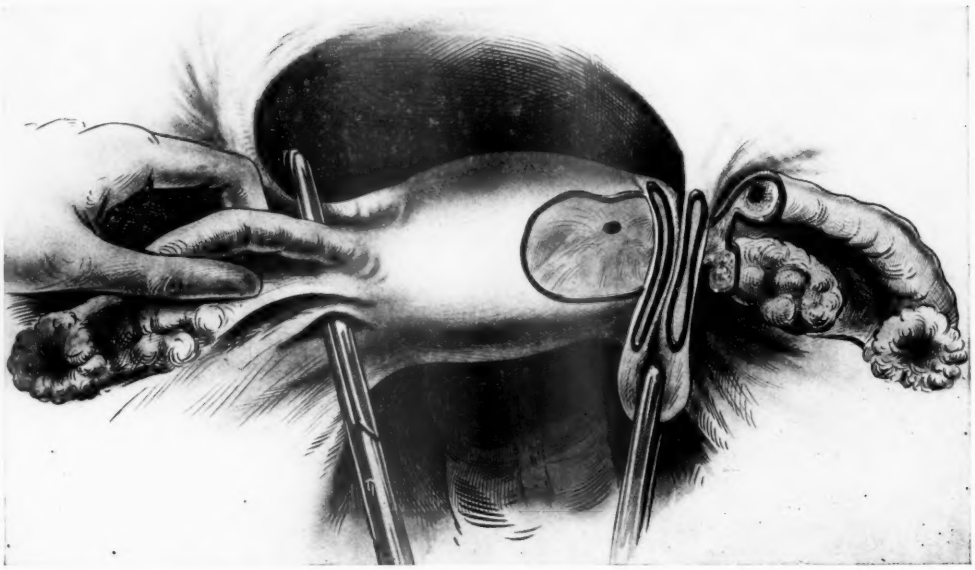


Fig. XXII. Webster's operation. Left round ligament with anterior fold of broad ligament being drawn through the broad ligament; right round ligament drawn through ready for suturing to posterior surface of uterus. (Continuous red lines represent peritoneum.) (Semi-diagrammatic.)

has the disadvantages that many patients have difficult labors afterwards. Many of them, while the uterus remains in position, still have the old backaches and nervous symptoms experienced before the operation, probably due to the fixing of the uterus which is normally a movable organ and the reflexes of which go to the back. Notwithstanding its faults this operation will always be regarded as one of the most important steps in the development of surgery for retrodisplacement of the uterus.

The operation of type No. 2 was described by Alexander and has always carried his name. In this case the round ligament is sought just outside the external abdominal ring. It is then drawn down through the inguinal canal from two to four inches, bringing with it into the inguinal canal, its peritoneal covering, which is in reality the anterior fold of the broad ligament (Fig. XVIII). The ligaments are then sutured to the firmer structures of the abdominal wall and by some have been crossed and sutured to each other. The peritoneum which is brought out with the ligament is, by the pressure of the inguinal canal, obliterated just as it is obliterated following the descent of the testicle. Some have pushed the peritoneum back into the inguinal canal, but the same thing occurs here for the pressure of the internal ring shortens the peritoneum just as in the other case; thus the anterior fold of the broad ligament is shortened several inches even in the Alexander operation (Fig. XIX). This operation has been more or less successful and has been used by many, but has never become generally popular, because of the inability of the surgeon to treat diseased conditions which are usually present accompanying the displacement. Some surgeons, then, with the round ligament idea still clinging, began to openthe abdomen for the purpose of treating the pelvic pathology, but passed forceps through the abdominal incision between the layers of the abdominal wall and grasped the round ligament extraperitoneally, so as to shorten it without involving the broad ligament. Needless to say, this operation was

Fig. XXIII. Results obtained after Webster's operation. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Semi-diagrammatic.)

found wanting and was soon discarded, but it was substituted by the third type of operation mentioned in our classification, in which the forceps is passed between the layers of the abdominal wall, some going between the fascia and muscle and some going between the peritoneum and muscle. The peritoneum is punctured and a loop of the round ligament, along with the anterior fold of the broad ligament which covers it, is drawn out through the abdominal wall and sutured to the firmer structures or sutured to each other. This operation has been very successful and is to-day one of the most popular of the operations. The chief drawback, which has been frequently noticed, is the continuous backache. Backache is the principal symptom reflected from all abnormal conditions of the uterus including abnormal menstruation, labor, lacerated cervix, or a too firm fixation of the uterus to the abdominal wall. Inasmuch as the round ligament has the histology of a movable, muscular, active organ and is classified by some as a real part of the uterus in structure, I think we are justified in suspecting that this pain is due to the fixing of a movable organ which is a part of the uterus. The idea in this operation was probably suggested, first, by Dr. A. H. Ferguson of Chicago, and was largely perfected by Gilliam of Columbus, Ohio, and has been modified and materially improved by Montgomery, Barrett, Noble of Atlanta, Mayo, and others, but they all involve the same principle that is shown in this picture. As will be seen by the drawing (Figs. XX and XXI), a large fold of the broad ligament is drawn out through this hole in the abdominal wall and would shorten the anterior fold of the broad ligament several inches. This type of operation is deservedly very popular.

The fourth type of operation is the one in which the forceps is passed through the broad ligament beneath the ovary and tube, where it grasps the round ligament with its covering of broad ligament and draws it through both the anterior and posterior layers of the broad ligament to the posterior surface of the uterus. (Fig. XXII and XXIII.) This operation was described by Webster and, without doubt, is one of the most rational of the operations that have been presented. Here again the anterior fold of the broad ligament is the part shortened. Here, according to the experiments and the principles previously set forth in this paper, the

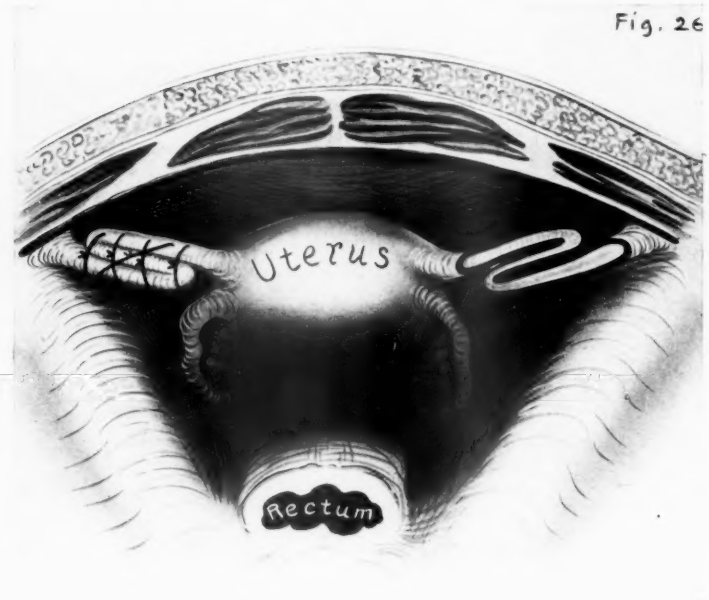


Fig. XXIV. Mann's operation. Round ligament with its peritoneal covering is folded in triplicate. (Continuous red lines represent peritoneum.) (Semi-diagrammatic.)

peritoneal covering over the round ligament blends with that of the surface of the uterus and also becomes continuous with the posterior and anterior folds of the broad ligament, thus shortening the broad ligament just as much as it is drawn through.

In the fifth type of operation, the round ligament with its covering of broad ligament peritoneum is folded upon itself and sutured. An operation of this type has been described by Wylie, Palmer, Dudley and others, but the technique as described by Mann, shown here (Figs. XXIV and XXV), is probably the best. This has deservedly been a very popular operation and is, without doubt, one of the very best. As will be seen in the right ligament of Fig. XXIV, the peritoneum of the anterior fold of the broad ligament is shortened by several inches, producing the results shown in Fig. XXV, viz., a continuation of the surface peritoneum at the ends of the fold over the line of suture and obliteration of the intervening serous surfaces.

In discussing these operations, the principles of which I believe cover all the successful operations hitherto described, I have attempted to avoid the discussion of the various technical methods of doing the various types of operations in order to avoid confounding technical details with broader surgical principles. In discussing these various operations, it is due that I state that I formerly have done the ventral suspension, approximately two hundred times, but that the results of the other four types of operations here described have been learned through the literature and by hearsay. About five years ago, I described and illustrated before the Portland Medical Society, a method of posterior advancement of the round and broad ligaments to the posterior surface of the uterus after the removal of the Fallopian tubes. (Article published in Annals of Surgery, October, 1903). The results obtained by this method were so much freer from disagreeable symptoms than the old ventral suspension, that I began to plicate the round and broad ligaments on the front surface of the uterus in cases where the tubes were left and child-bear-

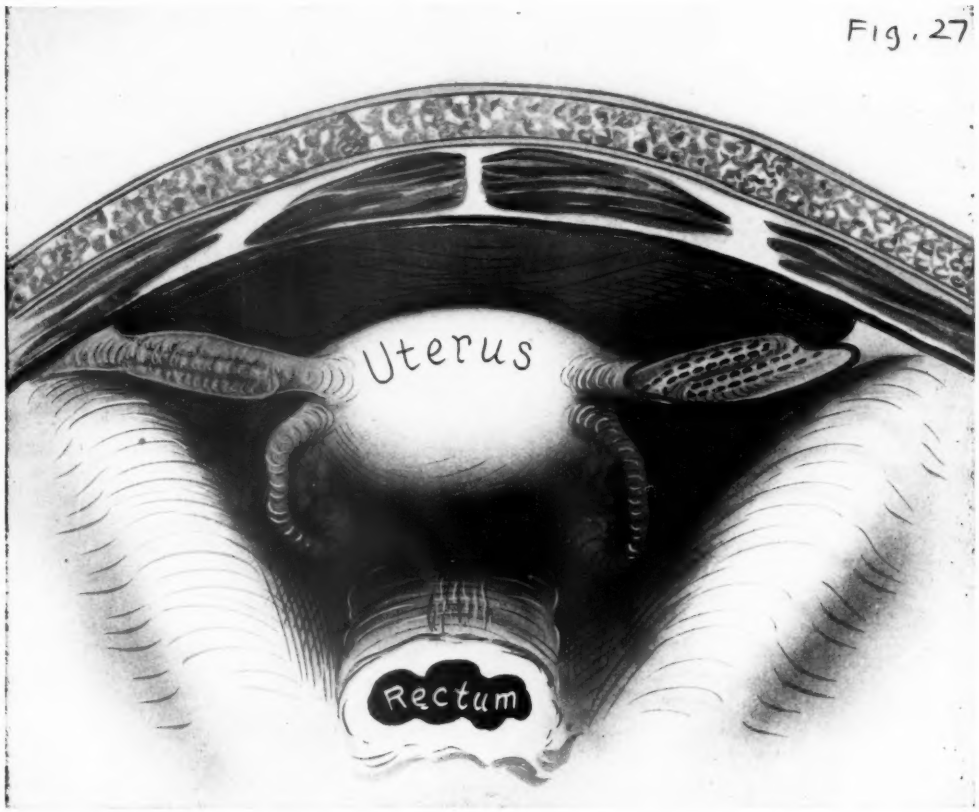


Fig. XXV. Results obtained after Mann's operation. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Semi-diagrammatic.)

ing was expected to continue, and at the meeting of the Rocky Mountain Interstate Medical Society at Denver in 1904, I reported sixty-five cases treated by this method. I have, up to the present time, done 214 operations by this method. I therefore beg to submit it as representing a sixth type of operation, but which involves the same principles as the other four mentioned, exclusive of ventrosuspension, in that it depends for its efficacy on shortening the anterior fold of the broad ligament. The technique of the operation is as follows:

Before beginning the operation proper, break up adhesions and treat adnexæ, lifting the uterus and packing a sponge back of it. Then seize the round ligament about an inch and a half from the uterus and with a number 2, or number 3 chromicized catgut suture, stitch to the anterolateral border of the uterus, at the beginning of the vesicouterine fold. Place three or four similar sutures between this point and the uterine end of the ligament (Fig. XXVII). Thus a double fold of the broad ligament is brought over to the side of the uterus.

2. Seize the ligament an inch and a half farther on and bring it up to a point just above and internal to the uterine end of the round ligament and fasten with a chromicized catgut suture. Place three or four more sutures between this and the first suture at the vesicouterine fold (Fig. XXVIII). Thus, two more

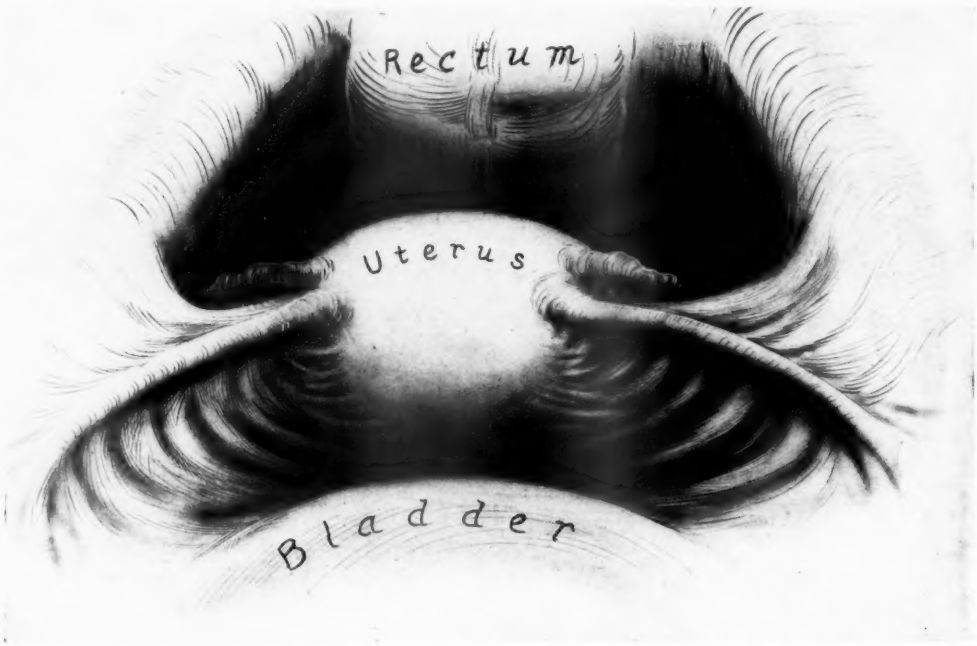


Fig. XXVI. Normal relation in partial retrodisplacement of the uterus as seen after breaking adhesions and reposition ready for suturing.

peritoneal or broad ligament layers are brought over to the side and front of the uterus.

3. With a number 1 or number 2 chromicized catgut continued suture, bring a fold of peritoneum from each side over the line of interrupted chromicized sutures. This continuous suture may include as much of the peritoneum as necessary to bring it taut; care must be used to avoid puling in the bladder. (Fig. XXIX.) Be careful not to include the entire thickness of the round ligament in any of the rows of sutures. No death has followed any of the 214 operations except one in which gonorrhœal pyosalpinx was encountered as a complication. Two cases of post-operative ileus occurred in the series, but were relieved by an emergency operation. In one case, the point of adhesion producing the ileus was at the stump of an ovary which had been treated conservatively, and in another, the obstruction was at the site of the appendix, which was removed at the operation. In one case there was a paralytic distension of the bowels requiring a colostomy six days after the operation, but the patient finally recovered. In five of the cases, non-septic phlebitis occurred about the beginning of the third week, just as the patients began to sit up, but none of them were serious. Of the 214 cases, I have been able to learn of but three relapses, two of which occurred in a series of twenty cases in which I tried a continuous simple catgut for the plication, instead of the interrupted chromicized. One of the three followed an attempt to purse the broad ligament. It is very evident that a continuous suture does not make sufficient pressure to cause a complete blending of the peritoneal surfaces. Of the 214 cases, three were prolapsed to the extent that the cervix would protrude through the vulva with the patient lying on the table. In these cases, the cervix was amputated high and the broad ligament tightly plicated both behind and in front of the uterus. All the cases were successful. I have learned of a

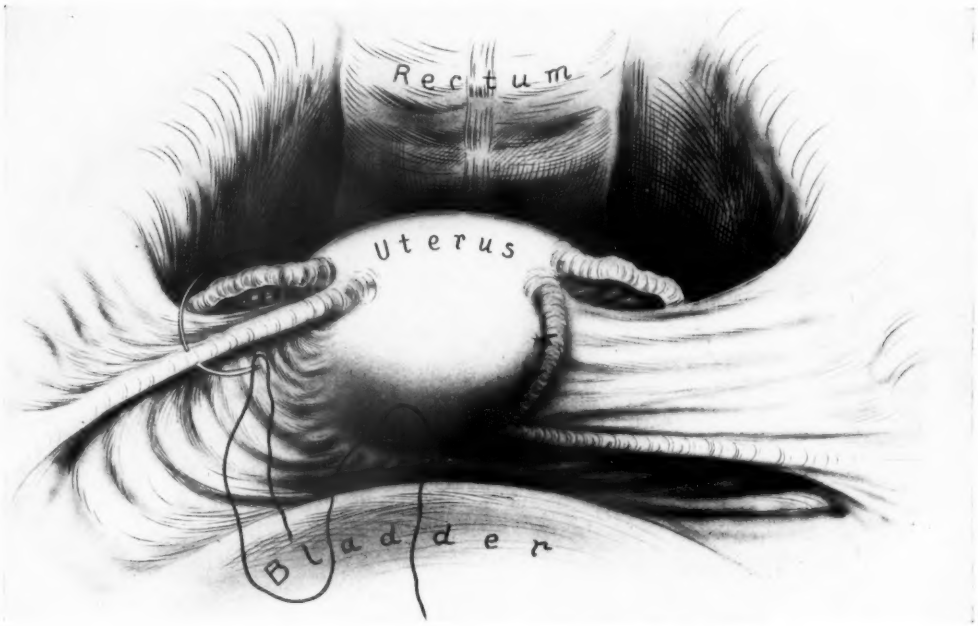


Fig. XXVII. First step in author's round and broad ligament plication.

number of the patients bearing children since the operation. All were uncomplicated and, as far as I can learn, the uterus remained in position after labor. An occurrence of vital importance and one which, to my mind, demonstrated the most important principle pertaining to this subject, is the anatomical condition left after the operation, as demonstrated on the operating table at subsequent operations on three of these patients. In two of my cases, I had to operate for the removal of cystic ovaries which were treated at the time of the first operation and left, and which later became seriously diseased. In one of these the second operation was done seven months after the plication and the other twelve. In both cases, the round ligaments had freed themselves in the connective tissue underneath the peritoneum of the broad ligament and had not only gained the normal position, but had gained their normal size notwithstanding one of the ligaments in each case was very much attenuated at the time of the original operation. Figs. XXX and XXXI. In another case, a pyosalpinx developed eight months after the first operation and the same normal condition of the round ligament was seen. The broad ligaments, while somewhat thicker than normal, showed no evidences of the operation otherwise, and the blending of the peritoneal surfaces had been perfect just as occurred in my animal experiments and just as occurred in the embryo. Dr. Suttner of Walla Walla, Wash., who has done the operation 32 times, did a secondary operation on two of his cases, one six months after the plication operation, for an attack of appendicitis, and the other, four months after the plication operation, for cystic ovary, and in both cases found the blending of the peritoneum of the broad ligament perfect and that the round ligament had freed itself under the peritoneum and assumed its normal position, just as in my cases. The results in these five cases observed at secondary operation, I believe, form the climax in the proof of the truth of principles we are trying to set forth.

Previous to beginning this operation, I had

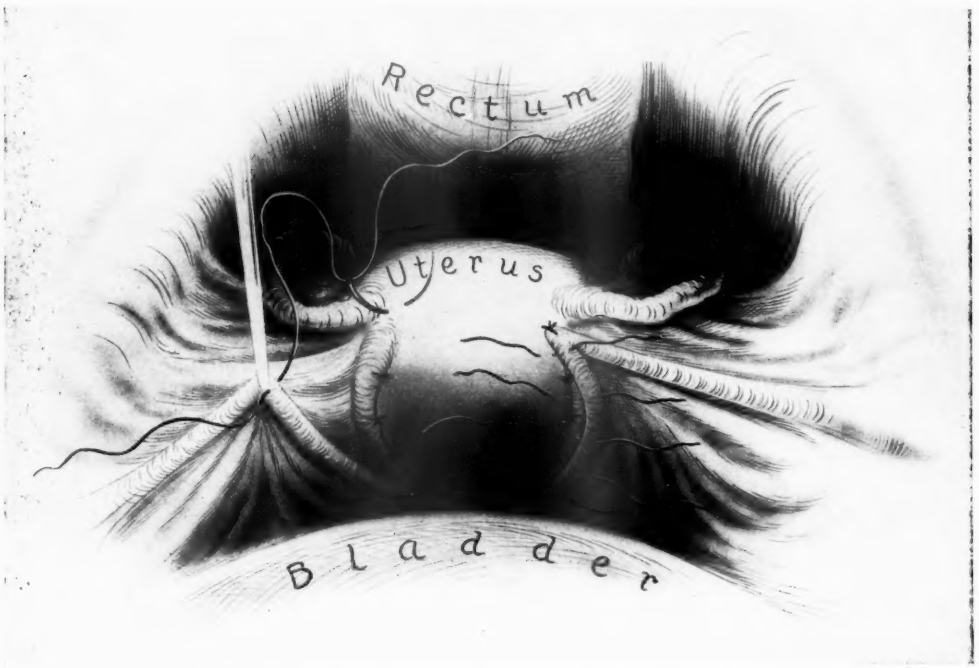


Fig. XXVIII. Second step in author's round and broad ligament plication.

done approximately 200 operations, using the ventral suspension in all but six cases in which I did the Alexander, and in three of the Alexander recurrence took place. I think not more than eight of the ventral suspension cases have been found to have recurred, but a number of the cases have had distocia in their confinement and a large proportion of them have not been relieved of their backaches and nervous symptoms. The plication operation has given so much better results that I would not do a ventral suspension or an Alexander operation, and for the same reason I must admit that I have not tried any of the newer operations which I have here described, notwithstanding the fact that the others would probably produce the same results if absorbable sutures were used.

Fig. I represents an operation I have done four times in cases where I have operated for inguinal hernia in the female, and in which a retrodisplacement existed. I have so far confined the operation to these cases, but as I have thought is over more carefully, I have concluded that it may be a very rational operation for many cases of retrodisplacement. The operation is performed as follows:

1. Make an incision through the skin, fat, fascia as in an operation for hernia.

2. Draw out the round ligament with its peritoneal covering and split the peritoneal sac, thus opening the abdominal cavity.

3. Through this opening break up adhesions and treat adnexæ.

4. Pull the peritoneum as far out as possible and suture the peritoneum at the internal ring, thus closing off the peritoneal cavity and leaving two or three inches of the peritoneum of broad ligament extraperitoneal, which shortens it that much.

5. Pass heavy chromicized sutures through the internal oblique muscle, the peritoneal sac, and round ligament from within and out through Poupart's ligament.

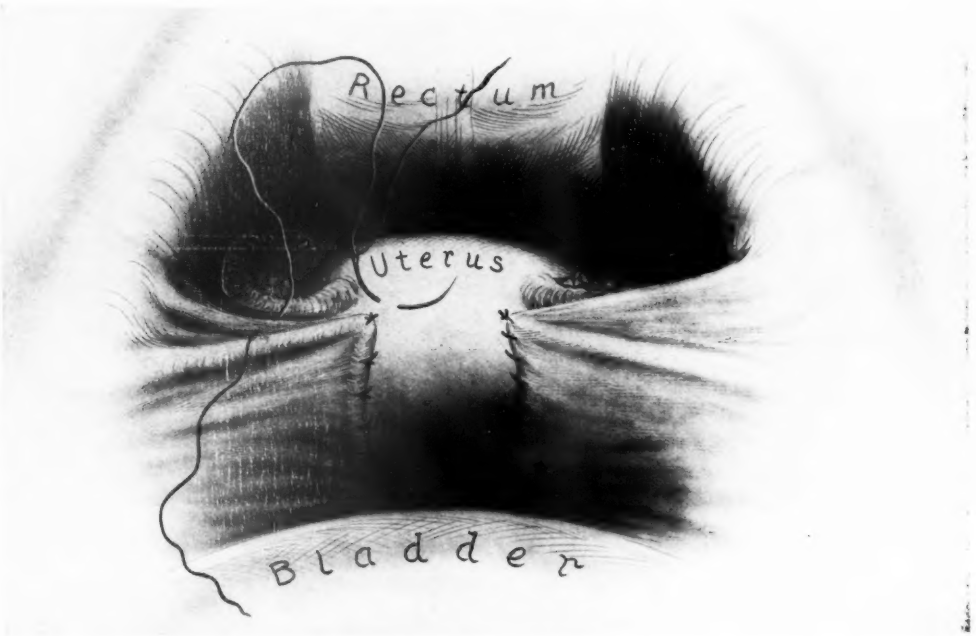


Fig. XXIX. Third step in author's round and broad ligament plication. Ligament to reader's right indicates completed operation.

About three of these sutures are used. From this point the operation is performed exactly as in closing the wound after a hernia operation.

The Bassini operation may be used or the Ferguson or any other method. I leave this optional as the principal point in the operation is the drawing out of several inches of peritoneum of the broad ligament and thus shortening it; thus, the peritoneum covering the round ligament is fixed to Poupart's ligament and to the internal oblique muscle. I have been in the habit of using the Bassini operation and have included a bight of the round ligament in the sutures closing the fascia of the external oblique. These cases have all been successful and I am hoping that it will prove to be even more rational and convenient than the other operations described.

DEDUCTIONS

1. The general scheme of nature is to hang all abdominal organs by peritoneal ligaments.

2. Peritoneal ligaments are strong enough to hold several times the weight of the organs they are intended to support and notwithstanding the fact that the normal resiliency of the various organs probably aids materially the peritoneal ligaments determine the position of the organs.

3. The peritoneum is non-elastic, but is held loosely in contact with the abdominal wall by a somewhat loose, elastic connective tissue which allows it to move freely on the abdominal wall at all points except at the diaphragm. Therefore the liver and spleen which are attached to and near the diaphragm are not allowed great latitude, while the stomach, intestines, and genital organs are progressively more freely movable as we get away from the diaphragm and are found pathologically displaced in the same relative order of frequency. Moreover, they are found most frequently displaced in general conditions of lowered vitality with absorption or overstretching of the extraperitoneal areolar con-

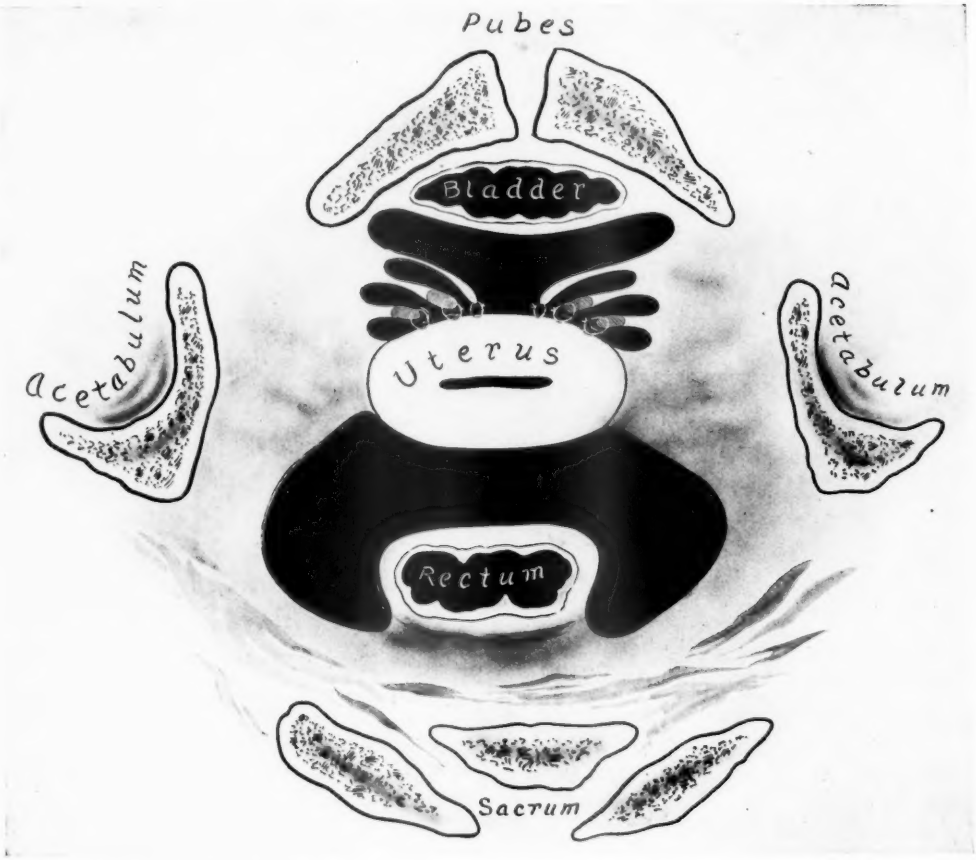


Fig. XXX. Cross section of pelvis through sacrum, acetabuli, rectum, pubic bones, uterus, and plicated round and broad ligaments and bladder, showing scheme of author's ligament plication. (Continuous red lines represent peritoneum.) (Diagrammatic.)

nective tissue which allows the peritoneum to pull away from the wall by the weight of the organs.

4. The peritoneum is ideally adapted for making new ligaments, inasmuch as "*When two peritoneal surfaces are brought together and held firmly in an aseptic state they adhere, blend, and obliterate, and the contiguous surfaces lose their endothelial covering and become continuous at the point of peritoneal union.*"

5. The only function of a muscle is to contract intermittently and thereby to produce motion. Muscular fibers are only found where motion is needed. A muscle will stretch and lose its power when subjected to constant action, but will regain its tone and shorten if the strain is entirely removed for a sufficient length of time.

6 The uterus is peculiarly placed in that it is partly abdominal and partly extraperitoneal. Its abdominal ligament (broad ligament) is attached near its middle, giving it a pivotal hanging with the heavy end above the pivot. In order to take as much weight of the suspensory ligaments as possible the uterus is directed at right angles to the vagina in

Fig. XXXI. Cross section of pelvis through sacrum, acetabuli, and pubic bones, showing results obtained after author's operation. The various folds of broad ligament have blended and the round ligament has freed itself in the connective tissue of the broad ligament and resumed its normal position. (Continuous red lines represent peritoneum; dotted red lines indicate obliterated peritoneum.) (Diagrammatic.)

animals which habitually assume the erect or perpendicular attitude when walking. Inasmuch as erect animals lie down part of the time it is necessary to provide muscles which will automatically maintain the normal relations, and which agent is found in the true ligaments of the uterus. Therefore a condition which causes weakening or destruction of the muscular ligaments of the uterus allows it to become parallel to the vagina in the erect position, thus making it a dead weight on its suspensory ligament which will eventually stretch the extraperitoneal connective tissue and allow a stretching and prolapse or, if only the round ligaments are weakened, a retroflexion.

7. Muscular ligaments act independently of the peritoneum and cannot be made to adhere permanently to its connective tissue side. Thus, when they are folded intraperitoneally, unless by permanent sutures they are permitted to rest, as the peritoneum of folded

broad ligament blends and carries the weight allowing the round ligaments time to rest and an opportunity to shorten and straighten themselves in the subperitoneal connective tissue.

8. A large amount of connective tissue is found in the neighborhood of the round ligament; therefore, it is well to fold the round ligament with the broad in order to add strength.

9. Ventral suspension or fixation is ideal for holding, but makes useless the round ligaments although they are not injured.

CONCLUSION

The ideal operation for retrodisplacements of the uterus consists in some form of operation which shortens the anterior fold of the broad ligament, at the same time temporarily utilizing the round ligament for its accompanying connective tissue, but which uses absorbable sutures and thus makes provision for complete recovery of the position and function of the round ligaments as soon as the sutures are absorbed.

THE OPERATIONS OF VENTROFIXATION OR VENTROSUSPENSION OF THE UTERUS AND SHORTENING THE ROUND LIGAMENTS

A Study and a Comparison

By WILLIAM ALEXANDER, M. D., F. R. C. S.
Hon. Surgeon Royal Southern and Workhouse Hospitals, Liverpool

THE writer has never performed either of the operations of ventrofixation or of ventrosuspension of the uterus on any of his patients, because he has always considered such operations opposed to sound physiological principles. The fundus uteri in woman is naturally free and mobile, and to fix it to the abdominal wall is to interfere fundamentally with nature's plan, and is, to him, an unnatural and wrong way of treating a uterine displacement.

His a priori arguments were soon supported by reports of accidents, such as abortions, miscarriages, herniæ, and hæmorrhages, etc., after such operations, showing that nature resented them very vigorously; but it was not till last summer that he was able to realize the full effects of these unnatural procedures. Within a few weeks of each other, two cases upon which such operations had been performed came to his clinic in such a distressful state that the uterus had to be released, and so a full opportunity was afforded of seeing the anatomical as well as the clinical results of the operation. He is much indebted to his house surgeon, Dr. Wallis, for the notes of the cases, and to his after-care the results of the treatment are largely due. The notes of the cases, shortened as much as is consistent with lucidity, are as follows:

Case 1. Emma B., age 35, was admitted to the medical ward of the Royal Southern Hospital on July 7, 1907, under the care of Dr. Carter, suffering from *dysuria and frequent micturition*. Patient requires to pass her urine every hour, but has a constant desire to micturate. Sometimes she has retention and requires to be catheterized. At other times the urine dribbles away. Patient has two children aged eleven and eight years. Her perineum was ruptured at the birth of her first child, but no urinary disturbance followed and scarcely any prolapse. After her second child the prolapse became more troublesome, but even then she had neither incontinence nor retention, and the symptoms of the prolapse were not very troublesome. In 1897 she applied at a Liverpool hospital on account of the prolapse which, she says, did not even then come outside to any great extent, but she felt it coming down and had some dragging, and she became uneasy about herself. She certainly had no urinary symptoms up to this time. She was taken into hospital and had ventrofixation or ventrosuspension performed. A few days after operation patient began for the first time to have trouble with her urine. Retention and incontinence alternated, and dysuria became constant. She remained in bed for eleven weeks after operation, and had medical treatment for the bladder symptoms without any effect. She also says the uterus was curetted three times to relieve the urinary symptoms, but these all failed. She was soon after discharged, and has suffered from the same symptoms ever since. The patient is a healthy, well-developed woman with

a uterus apparently normal in size as far as digital examination permits the formation of an opinion. The cervix is very high up in the pelvis, ovaries not felt and probably normal. There is an operation scar extending between the umbilicus and the pubis. Urine clear and chemically normal in every way. The incontinence was so evidently due to disturbance of the vesical dynamics, the result of the suspension, that after consultation it was agreed to explore the abdomen and if necessary to undo the operation of 1897. Accordingly, on July 11, 1907, the abdomen was opened in the middle line through the old cicatrix. At the lower part of the wound the fundus uteri came into view partially obscured by numerous adhesions through which the great omentum was attached to the abdominal wall, to the fundus uteri and to the corpus uteri, so that it was difficult at first to obtain entrance into the abdominal cavity. By ligaturing and cutting between, and by freeing the adhesions with the fingers, the parts were so cleared that the fundus uteri could be clearly seen. The anterior surface of the body of the uterus was firmly fixed to the abdominal wall by two firm pedicles about a quarter of an inch in length. The fundus uteri was retroflexed and projected backwards from the anterior abdominal wall into the peritoneal cavity where it was surrounded by adhesions. The uterus below the attachment to the abdominal wall was elongated and cord-like, evidently the result of stretching.

The pedicles attaching the uterus to the abdominal wall were cut through and stitched over so as to present smooth peritoneal surfaces; the uterus was dropped into the pelvis. The round ligaments, which were seen to be substantial structures, were shortened by folds and "reefs" so as to control the fundus and maintain it in a position of moderate anteflexion. The folds in the round ligaments were made permanent by fine silk sutures. The urinary disturbances ceased immediately after operation, the wounds healed by first intention, and the patient was discharged from hospital at the end of a month practically cured. She reported herself on January 19, 1908, nearly six months after operation, when she was free from all urinary troubles, and the uterus was in excellent position.

The second case, Ann B., age 37, was also admitted to the medical ward of the Royal Southern Hospital under Dr. Carter, on October 14, 1907, suffering from frequent micturition and a more or less continuous dribbling when standing or walking. When in the recumbent position she could retain her urine for six or seven hours, but at the end of the time she had to strain very much before any urine came away. Menses regular, but accompanied with pain.

Previous history. After the birth of a child four years ago, she began to suffer from dribbling of urine and "falling down of the womb." Perineorrhaphy was performed in a hospital in the Midlands with very little effect on the prolapse and none on the incontinence. Eight months later ventrofixation was performed in the same hospital with the result of curing the prolapse but still without any effect on the incontinence.

Patient is a healthy looking, fairly well developed woman. In the middle line of the abdomen below the umbilicus is the scar of an incision, and at the lower end of the scar the fundus can be felt by palpation. The patient is very miserable, and anxious that something should be done for her as she suffers not only from the pain, but is exceedingly unhappy and uncomfortable on account of the urine.

On October 17th, the abdomen was opened in the middle line, when the fundus uteri was found to be changed into an elongated, tongue-like structure, the upper end of which was fixed to the abdominal wall. There were also numerous adhesions between the omentum and the internal aspect of the abdominal wall and the altered fundus uteri. The omental adhesions were ligatured and cut, the tongue-like fundus was released from its unnatural attachment, the severed surfaces being stitched over and the deformed uterus dropped into the pelvis, where it was curious to see the rapid improvement in its shape. The round ligaments were now shortened intraabdominally as in the other case until they not only completely restrained the backward tendency of the uterus, but produced a mild degree of anteversion.

The wounds healed by first intention. Patient discharged November 11th, 1908. No dribbling, and patient can retain her urine from four to six hours. Uterus in good position. Soon after the patient went home she wrote that the bladder symptoms had returned to some extent. This was probably due to the imperfection of intraabdominal shortening of the round ligaments as compared with the original method of extraabdominal shortening. In intraabdominal shortening the thickest and most powerful part of the ligament is shortened and the strain on their weakest part is increased, whereas in extraabdominal shortening the frailest parts of the round ligaments are removed, and after this operation the check actions of the round ligaments are far more powerful than ever they were before. The patient was now completely cured.

Remarks

The first case is a glaring example of the direct and immediate bad effects of the operation of ventrofixation of the uterus. The patient the subject of some prolapsus uteri without other symptoms is rendered miserable by incontinence of urine and pelvic pain — far more serious complaints than the simple prolapse she formerly suffered from, as proved by the fact that she was very glad to undergo a second abdominal section in order to be relieved. The internal relations of the pelvic organs were completely changed. The uterus hung awkwardly from the abdominal wall with the fundus projecting backwards as an obstacle against which the intestines could beat, and the great omentum had numerous

adhesions to the different parts in the neighborhood of the old scar. The corpus uteri was changed into a long cord. When the adhesions were removed and the round ligaments curtailed, the uterus assumed rapidly its normal shape, the symptoms disappearing as if by magic. When the patient was seen six months after the operation the cure was maintained, and the uterus was in a normal position. It was not hanging by the round ligaments as some people suppose it ought to do. No human uterus ever does hang, except after ventrofixation. The ligaments now made a shortened circuit from the uterus to each ring and were able to exercise a favorable check action upon the fundus uteri when necessary.

In the second case the functions of the urinary bladder were seriouslv upset by the original prolapse which was of a much more severe character than in case 1. As perineorrhaphy had no effect on the urinary symptoms, there was probably more excuse for a suspension operation in this case than the last, but there is no doubt the displacement was over-corrected and the urinary trouble left after suspension was as much due to it as was the urinary trouble in the other case. When the uterus was released from its pendent position and the natural ligaments so shortened as to correct its relations, the symptoms disappeared.

In considering the conditions left after the ventrosuspensions in both these cases, the first thing that strikes us is the grossness of the procedure. The uterus was so attached to the abdominal wall in both cases that by the tension so produced the organ was dragged out of shape. Certainly the prolapse was cured, but very important physiological functions of the pelvic organs were put out of gear by the operation. The elongated uterus in the one case could not be expected to perform its functions naturally, and the retroflexed fundus, projecting as it did from the abdominal wall, must have marred the smoothness of the intestinal movements. Then the numerous adhesions, no doubt, added to the general discomfort, and the upward strain upon the bladder naturally destroyed the functions of that viscus, and hence the dysuria and incontinence. The complete restoration to comfort by releasing the captive uterus and shortening the round ligaments intraperitoneally shows that the ventrofixation was the cause of the urinary trouble, and one wonders why such a crude, rough operation was ever considered necessary. I have used the words gross, rough, and crude, in regard to ventrofixation because such operations are unnatural and quite out of harmony with nature's plans.

Let us consider for a few minutes the arrangements of nature in regard to the uterus. The uterus is a very mobile organ naturally. We can artificially prolapse it, turn it backwards or forwards or to either side of the pelvis without much effort, and yet when we cease our efforts at displacement, the healthy uterus resumes its natural state as if it moved into its place by its own accord. In the great majority of women the uterus retains its normal position through all the vicissitudes of child-bearing from infancy up to old age, and the means by which it does so are so delicate and unobtrusive that gynæcologists are still undecided as to what the means really are that maintain the uterus in position. The uterus somewhat the shape of an inverted cone is placed in a position of unstable equilibrium in the center of the pelvis, so that the uterus and broad ligaments form a partition dividing the pelvis into two unequal parts, a shallow anterior part that contains the bladder, and a deeper posterior part containing coils of large and small intestines. Both the bladder and small intestines support the fundus materially. The posterior half of the pelvis is to the uterus a much deeper pit than the anterior half of the pelvis, and when retroflexion takes place the results are far more serious than when anteflexion takes place. Hence, to prevent the backward displacements we have an additional check supplied by the round ligaments, two muscular cords that stretch from each side of the fundus uteri, lace up the broad ligaments and pull the uterus and broad ligaments forwards towards the pubis. The cervix is fixed in the floor of the pelvis in the meshes of the pelvic fascia and of the muscles that form the pelvic diaphragm, so that the same mobility and security, the same freedom with its limitations, are to be seen here as in the fundal relations of the uterus.

Then we must remember that during strains that affect the pelvic organs and the uterus we have associated actions by which more small intestines are packed in behind the uterus. The round ligaments contract, the muscles of the pelvic floor become tense and lift the cervix upwards and forwards well out of the way of the vaginal outlet. When the strain is over, all these actions cease until the next crisis calls them into play again. Each individual agent is refined and delicate and could not resist a determined counterforce. Hence in disease some part of the mechanism is put out of action and the synchronicity of the whole process is spoiled. The common forms of disease that destroy the equilibrium of the uterus are alterations of the uterine shape and consistence from menstrual congestions, inflammations, irregular and morbid evolutions that take place after abortions and miscarriages or after full time parturitions. All these alter the normal shape of the uterus, and the abnormal uterus reacts to the other equilibrium-producing agencies abnormally, so that the oscillating equilibrium of a normal uterus is no longer maintained. For instance, should the fundus uteri become retroverted through changes in the uterine form, the intestines instead of supporting the uterus behind will now ride over it and beat the fundus down into the deep posterior part of the pelvis, and the altered alignment of the round ligaments will destroy *their* check action. In young persons an irregular strain, through heavy lifting, over-reaching, sudden and irregular twists at gymnastics, often capsizes the uterus and broad ligaments. The consequent congestion and localized peritonitis quickly alter the size and freedom of the capsized fundus, adhesions are rapidly formed that prevent recovery of the organ. Naturally the attention of the doctor is not called to the discomfort at the time of the accident, and no attempt at reduction is then made as in other dislocations, and when the distress becomes clamant the alteration is irremediable except by operation. Then we have disease or the ovaries (enlargements, etc.,) and Fallopian tubes that act and react upon the uterus and upon the broad ligaments, stiffening both and preventing that light and easy play necessary for rapid adjustments as the body changes its position and carries out its usual daily functions. In multiparæ we have had the frequent enlargements of the abdomen, the stretching of the vagina necessary to allow the passage of the child's head, the strain upon the muscles of the pelvic floor, the yielding or rupture of the perineum at parturition, and the slipping forward towards the perineum of the uterine cervical attachments to the floor of the pelvis. If we add to these agents the relaxed muscles of a sedentary woman, we cannot but feel surprised that prolapsus uteri does not occur oftener.

For retroflexion the treatment that I think most in accord with the economy of nature is to straighten out the uterus until it assumes its natural shape, and shorten the round ligaments externally. During convalescence the natural shape of the uterus is maintained by an intrauterine stem pessary, and its position in the pelvis by a Hodge's pessary. A long experience proves that this operation well done cures the retroflexion and relieves the symptoms, and fits the woman for all the duties of life as before. There is no interference with the physiological action of the organ in the pelvis. Only external shortening of the round ligaments is here referred to, because there is strong reason to believe (as was said before) external shortening to be more effective than internal shortening. In two cases where small cystic ovaries had been removed, intraabdominal shortening was performed for retroflexion. In both the displacement recurred. The reason is obvious. The weakest part of the round ligament is its termination over the external abdominal ring, and the removal of that part in the external operation and the firm attachment of the proximal end to the pillars make the shortened round ligament a stronger and a more muscular structure throughout all its course than ever it was before. The intraabdominal shortening puts additional strain upon the weakest part of the ligament and hence the tendency to failure. The writer's attitude to the mode of shortening whether external or internal was at first one of indifference. It is not now, however, a matter of indifference. The effectual shortening is the external short-

Fig. 1. Position of the uterus before operation.

Fig. 2. Position of the uterus after the ligaments are shortened after the author's method.

ening where the distal end is removed and the proximal and thick end of the ligament inserted into the pillars of the ring. The use of the stem and the Hodge in retroflexion is essential to success; unless the recoil of the uterus is removed a recurrence will naturally take place. A substantial stem with a large base keeps its position in the uterus without any irritation, and at the end of three weeks when it is removed, the uterus has no longer any tendency to retrovert. The straightened uterus responds to the check actions of the round ligaments and the uterine equilibrium is once more normal. The suspension of the fundus uteri to the abdominal wall in retroflexion as a substitute for the shortening of the round ligaments seems to me a coarse and retrograde proceeding, and one sure to be abandoned as the physiology of the uterus is more and more understood. On the other hand, the round ligaments will be more and more utilized to correct backward displacements as their advantages for the purpose are more and more realized. The results of the practice of all men who have made themselves masters of the operation agree in proving that when well done the operation of shortening the round ligaments is an effectual and permanent cure for retroflexion. In cases where strong adhesions exist sufficient to prevent the replacement of the uterus by such simple means as the finger or the uterine sound, it will generally be found on close examination that there is some other disease present, and such other disease must be treated in the appropriate way by expectant or operative treatment before the round ligaments can be shortened. This operative treatment can be carried out either by the abdominal or vaginal route according to the nature of the disease and the predilections and habitual practice of each operator. In the writer's experience the cases of backward displacements suitable for the operation of shortening the round ligaments are rarely so adherent as to prevent the latter operation being performed, and after performance, incipient disease of the ovaries and tubes is often checked by the improved position of the uterus, and the more normal way in which that organ can now perform its functions. It is, however, in prolapsus uteri that ventrofixation is especially advocated, the position being ceded by a great number of surgeons and gynæcologists that shortening the round ligaments is the operation for simple backward displacements, but that it is *unsuitable* for *prolapse*. Now as the writer shortens the round ligament in prolapse, and as he maintains that in associating with

repair or advancement of the perineum, it is permanently effectual even in very bad cases, he will describe his procedure and give the reasons why the method is so effectual.

During the child-bearing period when prolapse is so troublesome that pessaries are of no avail because they cannot be worn or do not restrain the prolapse, he shortens the round ligaments and inserts a Hodge, directing it to be worn constantly. After operation a pessary can invariably be worn with comfort and effect until the child-bearing period is over, when, if necessary, the perineum should be repaired in the following manner: The mucous membrane of the lateral and posterior regions of entrance of the vagina just inside the labia minora is incised and stripped up with a pair of scissors, much in the same way as the late Lawson Tait recommended. The loosened mucous membrane is turned outwards and forwards and stitched in the middle line to form a barrier that extends from the rectum to well under the arch of the pubis, leaving a subpubic aperture just large enough for the tip of the little finger to be inserted there. The upper surface of the barrier is mucous membrane, the lower surface is raw. Outside the mucous barrier thus formed we have now a raw surface both laterally and posteriorly where lie the loose ends of the levator ani muscles and of the pelvic fascia.

By taking deep bites of this tissue by a large curved needle threaded with silkworm gut, we can bring together in the middle line of the perineum large masses of tissue that, when united, control completely the lower entrances of the vagina. We thus form a deep, broad, contractile perineum, that supports the pelvic viscera and prevents prolapsus uteri in future.

The figures 1 and 2 illustrate the principle on which these operations are performed.

In figure 1 the uterus lies at the upper part of a vagina that has no perineum and is so loosely attached that gravity and intraabdominal pressure combine to produce descent. The round ligament is elongated, and through the strain is in all these cases hypertrophied, approaching in thickness of the intraabdominal part that of the little finger instead of the ordinary thickness of a crow quill. The shortening of the round ligaments brings the fundus forward to a condition of slight anteversion, so that the uterus is at right angles to the vaginal outlet. The round ligaments are well qualified to maintain this position and are aided by the small intestine and sometimes by the pelvic colon that now find their place behind the uterus instead of in front of it as before. It will be easily intelligible with a glance at the two diagrams how a Hodge's pessary now becomes efficient and how it could not be efficient before, and suffices for those women who have not yet passed the child-bearing period. In those who have passed the child-bearing period a strong contractile, deep perineum, that keeps the small external orifice of the vagina well under the arch of the pubis, is constructed in the way I have mentioned, whilst the shortened round ligaments keep the fundus well inclined to the underlying pubis. The uterus moves about freely, but is confined to a certain area within which it moves and beyond which it cannot go.

SCOPOLAMINE–MORPHINE ANÆSTHESIA

With Report of Two Hundred and Twenty-nine Cases

By RICHARD R. SMITH, M. D., Grand Rapids, Michigan

A CONSIDERABLE literature on the subject of scopolamine-morphine for anæsthetic purposes has appeared both here and abroad, in which is displayed a marked divergence of opinion. Many surgeons who have apparently obtained much satisfaction from its use have written with considerable enthusiasm, while others, for various reasons, have energetically condemned it. The latter have apparently not obtained the results hoped for, have seen serious symptoms arise, or have been alarmed by the reports of accidents in the hands of others. Although one may personally have seen no untoward effects from its use, these reports and opinions are not to be lightly passed over. The advantages of any procedure must be marked indeed to allow of one's assuming any additional risk to the patient and I am convinced, from a review of the literature, that this is not a method which can be safely used without certain safeguards and restrictions. It has seemed to me that the chief danger has been in administering too much chloroform with the patient already under the influence of a powerful sedative. For instance, Delbet reports two deaths and alarming symptoms in another in a total of only sixty cases operated. This repetition of bad results in so short an experience suggests strongly where the fault lay. On the other hand, Grimm reports 2,850 cases in which this mixture plus a mixture of chloroform and ether was used without bad effects and with ever-increasing satisfaction. The number of cases of pneumonia following operation was reduced to one-third of the number in his previous experience.

It has been about three years since the mixture came into more or less extensive use in this country. In search for a means to reduce the vomiting following operation, we were led to give it a trial. The results in this respect have been considerable, but not as marked as was at first hoped for. Other results, however, have been so pleasing as to lead us to continue its use in selected cases. Anything which may safely diminish the physical and mental suffering incident to operative measures is worthy of investigation. With sensitive, nervous women especially, has it proven itself to be of marked value in our hands. We have *not* used it in patients under 15 or over 65, with those markedly debilitated or cachectic, or suffering from long-continued sepsis, with those suffering from diseases of the respiratory tract, or in operations about the mouth or throat. We have restricted its use to work in the hospital, where its administration can be controlled, and occasionally outside where we thought the action would be of special advantage. We have used it only in operations deliberately planned and not in emergency work. The anæsthetist should be a capable and experienced man. The advantages obtained have been as follows:

1. A calm state of the nervous system previous to operation. The patient goes to the operating-room without fear and lies, with closed eyes, upon the operating table during the period previous to the administration of chloroform. She will occasionally have but little remembrance of having been moved.

2. Preparation of the field of operation can be done before chloroform is administered. This shortens the time that the patient is under anæsthesia, since the time taken for a careful preparation is considerable and there are apt to be unexpected delays. Under this method, the moment the patient is anæsthetized, the incision is ready to be made.

3. The patient goes quietly and quickly under and with rarely any struggle or excitement.

4. There is rarely any vomiting or retching during this stage or while the operation is in progress.

5. There is no mucus to obstruct the air passages. This advantage is, of course, esespecially valuable where ether is used. For the last three reasons the operator is rarely

subjected to delays and the work of the anæsthetist is made easier.

6. The amount of anæsthetic used is decidedly diminished.

7. The patient sleeps after the operation, usually for an hour or more, sometimes three or four; during this period there is no pain nor vomiting.

8. Postoperative vomiting is decreased. I believe this is mainly because less anæsthetic is used. Those who have been most profoundly affected by the mixture have required less chloroform or ether and have shown the least nausea.

I have seen no untoward effects. The disadvantages are its necessarily restricted use and the variability of its action. Some patients are easily and satisfactorily brought under its influence, some not at all.

ADMINISTRATION

Scopolamine-morphine rapidly deteriorates, so that certain precautions are necessary in preparing the dose. We use Merck's scopolamine, put up in 15-grain vials. I have found tablets unreliable and I should be unwilling to use any scopolamine that I did not believe to be pure and uniform. One-half grain (.033+) of the alkaloid is weighed and put in a beaker containing 100 cc. of freshly boiled water. Four cc. (1 dram) is placed in a vial (aseptic). To this is added .033+ (½ gr.) morphine sulphate. Each bottle contains scopolamine .0012 (1|50 gr.), morphine .033+ (½ gr.) — the amount of three injections for one patient. As many bottles as will be necessary for the next few days are put up at one time. Each bottle is labeled with the name and amount of the mixture and the date of preparation. If not used within five days it is thrown away. One nurse takes charge of the administration. Two and one-half hours before operation one-third of the contents of a vial is given hypodermatically (with a syringe that doesn't leak), the second dose of like amount is given one and one-half hours, the third one-half hour before operation. Pulse, respiration, and mental state are watched. It there is a marked fall in the rate of respiration, say to twelve or below, or a fall or rise in the pulse rate of say twenty, or the patient is well asleep, the second or third dose is omitted or postponed. We do not aim to produce profound sleep. It is always possible to rouse the patient by a word, although the answers may be rather disconnected.

The patient is taken on a stretcher to the operating-room; a towel placed over the eyes seems to help to obtain quiet. The preparation of the field is done, if possible, before the chloroform or ether is administered. If this causes pain or marked restlessness, it is deferred and the anæsthetic begun. The drop method is, of course, used. It is difficult to tell, at first, just when the patient is ready for the incision. The eye reflex is not a reliable guide until the patient is thoroughly relaxed. After the operation is started it seems to be more reliable, the eye reflex becoming active before the patient shows any rigidity of the muscles. The pupil usually remains contracted, whatever the stage of the anæsthesia. A little experience usually does away with this slight disadvantage. We usually judge as to when to begin the operation by the facial expression and the amount of general muscular reaction. If the operation is to be an abdominal section, full anæsthesia is required during the opening of the abdomen and the walling off with the sponges. After this the anæsthetic may be almost completely withdrawn. The patient will usually require as much for the first fifteen minutes as she will for the next forty-five minutes, if the operation is to last that long. When the abdomen is about to be closed, a little more chloroform is given, but we like to see a patient stirring somewhat during the closure.

In order to more accurately judge of our results, we have kept certain records of the cases in which the mixture has been given, and a few records for control. We have used it in 229 cases altogether. This includes thirty cases previously published.[1] We have used:

	Cases
Scopolamine with chloroform in	207
Scopolamine with ether in	7
Scopolamine beginning with chloroform and ending with ether in	10
Scopolamine with cocaine in	1
Scopolamine alone in	4
Total	229

[1] Detroit Medical Journal, March, 1906.

Of these 129 were abdominal sections. There were 181 women and 48 men, ranging in age from fifteen to sixty-two. The operations were many of them long and difficult, seven of them requiring over two hours' time. To show that more chloroform is used at the beginning than later on, we found that in

28 operations of ½ hour or less an average of 4.2 drams chloroform required.
39 operations of 1 hour or less an average of 6.2 drams chloroform required.
38 operations of 1½ hours or less an average of 7.6 drams chloroform required.

In 138 cases, under the same anæsthetist, where the amount of chloroform was accurately recorded, an average of six drams an hour was required. In 64 operations without the mixture, an average of 9.5 drams was required. This shows a reduction of more than one-third of the amount. We have included all cases here in which accurate record was made. With many the scopolamine-morphine had no effect on pulse, respiration, or the mental state. These cases might better, perhaps, have been excluded in the estimation. With added experience we have been able to cut down the amount of chloroform considerably. It is not unusual to see an operation lasting an hour completed with three or four drams, one lasting forty minutes required but one dram.

In our 229 cases there was absolutely no vomiting nor retching on the table, except in 9 cases. This was very slight and never prolonged or repeated. We were able to do the preparation of the field without general anæsthetic in 141 cases, in 44 cases the preparation was done under chloroform. There was absolutely no vomiting after the patient was returned to bed in 55 cases, of which 23 were abdominal sections. We tried to obtain some accurate idea, by figures, as to the average reduction of post-operative vomiting, but gave it up as unsatisfactory. I think we can be safe in saying, however, that the average amount of vomiting was considerably reduced. I must acknowledge, however, that I have been rather disappointed in this regard, not having been able to get the good results obtained by others.

Three cases were more or less nervous or excited before operation, one case was awake and very talkative immediately afterward.

We kept no very accurate record of those apparently not affected in any way by the drug, but an estimation would perhaps give one in eight or ten.

In 207 of the 229 cases we gave chloroform; more recently and since completing these records, we have been trying ether. Our experience with the latter has been too small to be of value. We have noted, however, a marked reduction of mucus present in the respiratory passages. This agrees with the observations of others.

In four cases the mixture has been used alone. I think its use in this way might be extended to certain operations that are not very painful, but we have tried it a number of times and been obliged to complete the operation with a general anæsthetic. The patients complain too much or become restless. In a considerable number of cases a curettage was done previous to laparotomy, the chloroform not being given until after the completion of the former. This has usually worked satisfactorily and, of course, saves much time under anæsthesia. In one patient, whose several previous operations had showed marked and prolonged nausea, we did an amputation of the cervix and an extensive anterior colporrhaphy without pain and without subsequent nausea.

CONCLUSIONS

The employment of scopolamine-morphine previous to the administration of chloroform does not add to the danger of the latter, when used under proper limitations and restrictions.

It is especially valuable with nervous women requiring gynæcological and abdominal operations.

It reduces the mental distress previous to operation.

It allows, in the majority of cases, a complete and careful preparation of the patient in the operating-room before the administration of chloroform or ether is begun. The period of anæsthesia is thus considerably reduced.

It reduces markedly the amount of anæsthetic required.

It reduces the unpleasantness incident to taking an anæsthetic.

It does away with retching and vomiting on the operating table in almost every case.

It produces sleep for a variable, but usually considerable, period following operation; during this time there is no vomiting or pain.

It decreases somewhat postoperative vomiting.

BIBLIOGRAPHY

ABBOTT, W. C. Scopolamine-morphine anæsthesia. Internat. J. Surg., N. Y., 1906, vol. xiv, pp. 47-49.

ABBOTT, W. C. Hyoscine anæsthesia. Toledo, M. & S. Reporter, 1907, vol. xxxiii, pp. 163-165.

ARCE, J. El empleo de la escopolamina en cirugía. Rev. Soc. méd. argent., Buenos Aires, 1905, vol. xiii, pp. 127-143.

ANDERSON, W. Notes on scopolamine-morphine surgical anæsthesia. Pacific M. J., San Fran., 1905, vol. xlviii, pp. 727-729.

BABCOCK, W. W. A new method of surgical anæsthesia. Proc. Phila. Co. Med. Soc., Phila., 1905-6, vol. xxvi, pp. 347-357.

BÉRILLON. Des anesthésiques et en particulier de la scopolamine envisagés comme adjuvants à la suggestion hypnotique. J. de Neurol, Par., 1906, vol. xi, pp. 13-15.

BÉRILLON. Des anesthésiques, et en particulier de la scopolamine, envisagés comme adjuvants à la suggestion hypnotique. Rev. de l'hypnot. et psychol. physiol., Par., 1905-6, vol. xx, p. 307.

BERNARDINI, D. Sull' applicazione della anæstesia morifinoscopolaminica nel cane. Clin. Vet., Milano, 1907, vol. xxx, pt. 2, pp. 2-13.

BLOCH, E. La narcose scopolaminique en oto-chirurgie. Presse oto-laryngol. belge, Brux., 1903, vol. ii, pp. 625-636.

BLOCH, E. Zur Skopolaminnarkose in der Ohrchirurgie. Beitr., z. Ohrenh. Festschr., Berl., 1905, pp. 129-140.

BONHEIM. (Ueber 70 Morphium Scopolaminnarkosen.) Deutsche med. Wochnschr., Leipz. & Berl., 1904, vol. xli, pp. 882-884.

BRYANT, E. R. A report of personal experience with scopolamine-morphine and spinal anæsthesia. N. Am. J. Homœop., N. Y., 1907, vol. lv, pp. 537-550.

BUMKE. Scopolaminum (Hyoscium) hydrombromicum. Monatschr. f. Psychiat. u. Neurol., Berl., 1903, vol. xii, 62; p. 124.

BUSSE, W. Ueber die Verbindung von Morphium-Skopolamininjektionenemit Rückenmarksänasthesie bei gynäkologischen Operationen. München Med. Wochnschr., 1906, liii, 1858-1860.

CHEYLAN, G. L'anæsthésie scopo-Morphinique. Montpel. méd., 1906, vol. xxiii, 1-8 pp.

CLOUSTON, T. S. On the Scottish Medical Corporations and the Public Weal: How they might Develop a Healthy Conscience. British Med. Jour., 1903, pp. 61-63; Also: Lancet, Lond., vol. ii, pp. 81-84. Also: Scot. M. & S. J., Edinb., 1903, vol. 13, pp. 97-109.

COLLINS, C. N. Scopolamine and morphine as a preliminary to general anæsthesia. Virginia Med. Semi-Month., Richmond, 1907, vol. xii, pp. 97-101. L. 610.51. Vol. 814.

COLLINS, C. N. Scopolamine and morphine as preliminary to general anæsthesia. Virginia Med. Semi-Month., June 7, 1907, J. A. M. A. (81) 443, 1907, p. 2.

DAGNEAU, P. C. L'anesthésie par la scopolamine-morphine en ce qu'il faut en penser. Bull. Med. de Quebec, 1905-6, vol. vii, pp. 152-158.

DE ALMEIDA, D. A anesthesia pela scopolamina. Rev. med. cirurg. do Brazil, Rio de Jan., 1905, vol. xiii, pp. 249-256.

DEFONTAINE. Sue l'emploi de la scopolamine comme anæsthésique. Bull. et mém. Soc. de chir. de Par., 1905, n.s., vol. xxxi, pp. 653-656.

DEJARDIN, F. Sur un nouvel anesthésique général; la scopolamine et sur l'anesthésie par le chloroforme et ses derniers perfectionnements. Ann. Soc. méd. chir. de Liége, 1905, vol. xliv, pp. 235-256. 1 tab.

DEJARDINS. Note sur l'emploi de la scopolamine, comme anesthésique général en chirurgie. (Rap. de F. Terrier.) Bull. et mém. Soc. de chir. de Par., 1905, n. s., vol. xxxi, pp. 176-190.

DELBET, P. Mort. par la scopolamine. Bull. et mém. Soc. de chir. de Par., 1907, n. s., vol. xxxiii, pp. 742-746.

DE MAURANS. Comment on meurt dans l'anesthésie générale par la scopolamine-morphine. Semaine Méd., Par., 1905, vol. xxv, pp. 529-532.

DENIS, P. L'anesthésie générale à la scopolamine. J. Méd. de Brux., 1906, vol. xi, pp. 1-9.

DIEZ, S. Sui vantaggi della narcosa mista scopolomorfio-cloroformica. Policlin., Roma, 1906, vol. xiii, sez. prat., pp. 751-753.

DORÉ, J. La scopolamine, comme anesthésique général. Gaz. Méd. Nantes, 1905, 2. s., vol. xxiii, pp. 965, 980, 1000.

DOUCET, P. La scopolamine associée au chloroforme. Gaz. Med. de Nantes, 1907, 2. s., vol. xxv, pp. 21-35.

EASTMAN, J. R. Scopolamine-morphine anæsthesia. Centr. States M. Monit., Indianap., 1905, vol. viii, p. 326.

EASTMAN, J. R. Scopolamine-morphine anæsthesia. Illinois Med. Bull., Chicago, 1905-6, vol. vi, p. 562.

ELY, G. W. A fatal case of scopolamine poisoning. N. Y. M. J. (etc.), 1906, vol. lxxxiv, p. 799.

FARNSWORTH, T. J. Anæsthesia from morphine and scopolamine. Vermont Med. Month., Burlington, 1906, vol. xii, p. 79.

FASANO, M. La scopolamina nell'anæstesia generale chirurgica. Policlin., Roma, 1906, vol. xiii, sez. prat., pp. 481-486.

FLATAU, S. Ueber die Anwendung der Morphium-Skopolaminnarkose in der Gynäkologie. München. Med. Wochnschr., 1903, vol. i, pp. 1198-1202.

GASCA (MARIA) AND DIEZ (S.) Le iniezioni di scopolamina nell'iperemesi delle gravide, e nei vomiti concomitanti alcune malattie dell'utero. Gior. d. r. Accad. di med. do Torino, 1906, 4. s., vol. xii, pp. 307-312.

GAUSS, C. J. Die Anwendung des Skopolamin-Morphium-Dämmerschlafes in der Geburtshilfe Med. Klin., Berl., 1906, vol. 2, pp. 136-138.

GETZLAFF, B. J. F. Four years of experience with scopolamine-morphine as a general anæsthetic. West. M. Rev., Lincoln, Neb., 1906, vol. xi, pp. 18-21.

GREVESEN, L. Nochmals die Morphium-Scopolamin-Narkose. München. Med. Wochnschr., 1903, vol. i, p. 1383.

GRIMM, W. Beitrage zur klin. Chir., Tübingen, 1907, vol. lv, L 617.053. B 395.

HARLAN, E. Scopolamine-morphine anæsthesia. Lancet Clinic, Cincin., 1905, n.s., vol. lv, p. 504.

HARTOG, C. Die Aethernarkose in verbindung mit Morphium-Skopolamininjektionen. München. Med. Wochnschr., 1903, vol. i, pp. 2003-2005.

HASSLER, J. W. Why scopolamine? J. Surg., Gynec., and Obst., N. Y., 1906, vol. xxviii, pp. 231-236.

HENDEE, L. A review of the literature of scopolamin morphin anæsthesia. Am. Med., Phila., 1906, vol. xi, pp. 216-219.

HIEBER, A. Die Morphium-Scopolamine-Narkose. Internar. Centralbl. T. Ohrenh., Leipz., 1905, vol. iii, pp. 299-307.

HIRSCH. Ueber Skopolamin-Morphium-Narkose. München. Med. Wochnschr., 1906, vol. liii, p. 1442.

HOCHEISEN. Ueber Geburten unter Scopolamin-Morphium. Ztschr. f. Geburtsh. u. Gynäk., Stuttg., 1907, vol. lix, pp. 131-159.

HOLT, W. L. Scopolamine-Morphine in Obstetrics. Am. J. Clin. M., Chicago, 1907, vol. xiv, pp. 565-577.

HOLTZBACH, E. Skopolamindämmerschlaf in d. Geburtshilfe. Münch. Med. Wochnschr., vol. liv, (Nos. 24-25), 1907.

ISHAM, MARY K. Scopolamine-morphine-chloroform anæsthesia. N. York Med. J. (etc.), 1905, vol. lxxxii, pp. 1102-1110.

JALAGUIER. Anesthésie chloroformique après injection de scopolamine et morphine. Bull. et mém. Soc. de chir. de Par., 1906, n.s., vol. xxxii, pp. 424-426.

KLEIN, NETTIE. Indications and contra-indications for the use of chloroform, ether and scopolamine. Texas State J. M., Forth Worth, 1906, vol. vii, pp. 212-214. 610.51. T 315.

KLEIN, G. Bilsenkrantextrakt als Narkoticum. Münch. Med. Wochnschr., 1907, vol. liv, No. 22. Historical sketch of scopolamine.

KOBERT, R. Ueber reines und unreines Skopolamin. Ztschr. f. Krankenpfl., Berl., 1905, vol. xxvi, pp. 92-96.

KOBERT, R. Ueber reines und ureines Skopolamin. Ztschr. f. Krankenpfl., Berl., 1905, vol. xxvii, 41, 92, 137.

KOCHMANN, M. Ueber die therapeutischen Indicationen des Scopolaminum hydrombromicum; (Zugleich ein Beitrag zur Schneiderlin-Korff'schen Narkose). Therap. d. Gegenw., Berl., u Wein, 1903, n.f., vol. v, pp. 202-211.

KOCHMANN, M. Beiträge zur Wirkung des Scopolaminum hydro-bromicum. Arch. internat. de pharmacod., Brux. et Par., 1903, vol. xii, pp. 99-128.

KOCHMANN, M. Zur Fragee der Morphin-Skopolaminnarkose. München. Med. Wochnschr., 1905, vol. lii, p. 810.

KORFF, B. Morphin-Skopolamin-Narkose. München. Med. Wochnschr., 1903, vol. i, pp. 2005-2008.

KORFF, B. Weitere Erfahrungen zur Scopolamin-Morphin-Narkose. Berl. klin. Wochnschr., 1904, vol. xli, pp. 882-884.

KORFF, B. Mitteilungen zur Morphin-Scopolamin-Narkose. Korf, Berl. klin. Wochnschr., 1906, vol. xliii, pp. 1626-1629. L 610.53. B 452.

KÖRNER. Narcósis con escopolamina. Rev. Méd. de Chile, Sant. de Chile, 1904, vol. xxxii, p. 261.

KESSEL, O. G. Ueber die Werkung von Scopolaminen mit verschiedenem optischen Verhalten. Arch. Internat. de pharmarod., Brux. et Par., 1906, vol. xvi, pp. 1-32.

KREUTER. Erfahrungen mit Skopolamin-Morphium-Chloroform-Narkose. München. Méd. Wochnschr., 1907, vol. liv, p. 415. 610.53. M 92.

KRÖNIG. Weitere Erfahrungen über die Kombination des Skopolamin-Morphiumdämmerschlafes mit der Rückenmarksanästhesie bei Laparotomien. Zentralbl. f. Gynäk., Leipz., 1906, vol. xxx, p. 1215.

KRÖNIG. Ueber Rückenmarksanästhesie im Skopolamindämmerschlaf. Deutsche med. Wochnschr., Leipz., u. Berl., 1906, vol. xxxii, p. 1061.

KRÖNIG. Ueber Rückenmarksanästhesie bei Laparotomien im Skopolamin-Dammerschlaf. Verhanal d. deutsch. Gessellsch. f. chir., Berl., 1906, vol. xxxv, pp. 118-121.

LANDAU, H. Der Tod in der Morphium-Skopolamin-Narkose. Deutsche med. Wochnschr., Leipz. u. Berl., 1905, vol. xxxi, pp. 1108-1111.

LANPHEAR, E. Hyoscine-morphine or "scopolamine morphine" for surgical and obstetrical anæsthesia. J. Surg., Gynec. and Obst., N. Y., 1907, vol. xxix, pp. 347-351.

LASEK, F. Prispevk k narkose skopolaminmorfiové (Contribution to narcosis with scopolamin-morphine.) Casop. lék. cesk., v Praze, 1905, vol. xlv, pp. 31-35.

LAURENDEAU, A. Du bromhydrate de scopolamine comme an sthésique. Bull. Méd. de Québec, 1904-5, vol. vi, pp. 341, 389, 437, 511; 1905-6, 7, 6.

LAURENDEAU, A. De l'anesthésie chirurgicale par la scopolamine-morphine. Bull. Méd. de Québec, 1905-6, vol. vii, pp. 241-251.

LAURENDEAU, A. La scopolamine; son emploi en chirurgie et en obstetrique. Union Méd. du Canada, Montreal, 1906, vol. xxxv, pp. 704-709. 1907, vol. xxxvi, pp. 17-23.

LEHMANN, O. Ueber Scopolamin-Morphiumanalgesie in der Geburtshilfe. Zeitschr. f. Geburtsh. u. Gynäk., Stuttg., 1906, vol. lviii, pp. 297-305.

LIEPELT, K. Ueber die Verwendung des Scopolaminum hydrobromicum in der ärztlichen Praxis. Berl. klin. Wchnschr., 1904, vol. xli, p. 387.

LINK, R. Ueber das Anftreten des Babinskischen Reflexes nach Skopolamin-Injektionen. Ztschr. f. klin. Med., Berl., 1906, vol. lix, pp. 252-260.

LOGAN, J. C. The use of scopolamine in anæsthesia. Am. J. Nursing, Phila., 1905-6, vol. vi, pp. 166-170.

LORANZO, R. Los nuevos anestésicos en cirurgia; anestesia por scopolamina-morfina; raquistovainizacion. Clin. mod., Zaragoza, 1906, vol. v, pp. 282-297.

LORENZELLI, E. Sulla narcosi cloromorfio-scopolaminica. Riforma med., Palermo-Napoli, 1906, vol. xxii, pp. 175-179.

LOVRICH, J. A scopolamin-narcosisról. Gynækologia, Budapest, 1904, pp. 29-40.

MALABY, Z. T. Scopolamine-Morphium anæsthesia: its indications and advantages. South Calif. Proct., Los Angeles, 1906, vol. xxi, pp. 548-551.

MARCHESINI, O. Inuovissini progressi dell'anestesia del midollo spinale; cocaina, solfato di megnesia, stovaina, alipina, novocaina, Scopolamina. Gazz. d. osp., Milano, 1907, vol. xxviii, pp. 241-246.

MARMETSCHKE, GUSTAV. Ueber die Scopolamin-Morphin-Narkose. Leipz., 1904, B. Georgi. 82. p. 8°.

MERGARI, A. La scopolamina come anæstetico generale in chirurgia. Gazz. Med. d. Marche, Porto Civitanova, 1906, vol. xiv, No. 7, pp. 3-5.

MONOD, C. A propos de la scopolamine. Bull. et mém. Soc. de chir. de Par., 1905, n.s., vol. xxxi, pp. 783-788.

MOORE, G. A. Scopolamine. Boston M. & S. J., 1905, pp. 153, 429.

MORAN, M. M. The new surgical anæsthesia, with reports of cases by the hyoscine-morphine method. Virginia M. Semi-Month., Richmond, 1906-7, vol. xi, pp. 471-473.

MORTALITÉ, LA. de l'anesthésie générale par la scopolamine-morphine. Semaine med. Par., 1905, vol. xxv, p. 15. 610.54. S 471.

NEWELL, F. S. .Scopolamin-Morphin Anesthesia in Obstetrics. Surg., Gynæ. & Obst., Aug., 1907.

NORRIS, H. Scopolamine-morphine anæsthesia. Univ. Penn. M. Bull., Phila., 1905-6, vol. xviii, pp. 234-236.

NOUVEL, (UN). Anesthésique général en chirurgie: la scopolamine. Scapel, Leige, 1904-5, vol. lvii, pp. 304-306.

PANSIER, P. Intoxication par la scopolamine en collyre. Bull. et mém. Soc. de méd. de Vaucluse, Avignon, 1905, vol. i, pp. 69-71.

PARISOT, J. Action physiologique de la scopolamine sur l'excitabilité nerveuse et musculaire. Compt. rend. Soc. de biol., Par., 1906, vol. lx, pp. 1085-1087.

PENKERT, M. Lumbalanästhesie im Morphium-Skopolamin-Dämmerschlaf. München Med. Wochnschr., 1906, liii, pp. 646-648.

PENKERT, M. Besteck für die Lumbalanästhesie im Morphium-Skopolamin-Dämmerschlaf für die Bauchchirurgie und gynäkologische Laparotomien. Illust. Monatschr. f. arztl. Polyrech., Berl., 1907, vol. xxix, pp. 41-44.

PENSA, G. La scopolamina come anestesico generale. Osp. magg. Riv.-scient. prat. d. di Milano, 1906, vol. i, pp. 119-141.

PLETH, V. Scopolamine-morphine as an adjuvant to general anæsthesia. St. Louis M. Rev., 1906, vol. liii, pp. 346-348.

PSALTOFF. De l'anesthésie par le chloroforme après injection de scopolamine. (Rap. de C. Walther.) Bull. et mém. Soc. de chir. de Par., 1906, n.s., vol. xxxii, pp. 231-242.

PALERMO, N. La narcosi morfio-scopolaminica associata alla chloroformica. Riforma med., Palermo-Napoli, 1005, vol. xxi, pp. 765-769.

PUSCHNIG, R. Ueber neuere Narkosemittel und-Methoden, insbesondere Morphin-Skopolamin. Wien. klin. Wochnschr., 1905, vol. xviii, pp. 395-405.

RECASENS. La escopolaminia en el parto. Rev. de med. y. cirug. práct., Madrid, 1905, vol. lxix, pp. 454-460.

RICE, R. A. Scopolamine-morphine: ethyl-ether anesthesia based on 150 cases. Ohio M. J., Columbus, 1905-6, vol. i, pp. 321-323.

RIES, E. Scopolamine-morphine anæsthesia. Ann. Surg., Phila., 1905, vol. xlii, pp. 193-200.

RIES, E. Scopolamine-morphine anæsthesia. Surg., Gynec. and Obst., Chicago, 1905, vol. i, p. 354.

ROITH. Zur kombinierten Skopolamin-Morphin-Chloroform-Narkose. München. med. Wochnschr., 1905, vol. lii, pp. 2213-2218.

ROLANDO, S. Sull'anestesia colla scopolamina. Boll. d. r. accad. med. di Genova, 1906, vol. xxi, p. 145.

ROUFFART AND WALRAVENS. A propos de la narcose scopolaminique; étude de soixante-cinq observations personnelles. J. méd. de Brux., 1906, xi, 17, 36.

ROUFFART AND WALRAVENS. A propos de la narcose scopolaminique; étude de soixante-cinq observations personnelles. J. méd. de Brux., 1906, vol. xi., p. 52.

ROUTIER. A propos de la discussion sur l'anesthésie par la scopolamine. Bull. et mém. Soc. de chir. de Par., 1906, n.s., vol. xxxii, pp. 377-384.

ROYSTER, H. A. Scopolamine-morphine-ethyl-chloride-ether anæsthesia. Surg., Gynec. & Obst., Chicago, 1906, vol. ii, pp. 166-168.

ROYSTER, H. A. Scopolamine-morphine-ethyl-chloride-ether anæsthesia. Tr. South Surg. & Gynec. Ass. 1905, Phila., 1906, vol. xviii, pp. 282-291.

RUSSELL, L. E. Morphine scopolamine anæsthesia. Eclect. M. J., Cincin., 1907, vol. lxii, p. 630.

RYS, B. Smrtelná otrava po injekei skopolaminomorfiové. (Fatal poisoning by injecting scopolamine-morphine.) Casop. lék. Cesk., v. Praze, 1905, vol. xlv, pp. 493-495.

REID, K. L. Morphine and scopolamin as preliminary to anæsthesia: report of sixty cases of ether and five chloroform anæsthesia preceded by morphine and scopolamin. Atlanta Jour.-Rec. Med., 1905-6, vol. vii, p. 804.

SABADINI AND BEN BRIMAT. La scopolamine en injections sous-cutanées comme anesthésique général en chirurgie. Bull. méd. de l'Algérie, Alger, 1905, vol. xvi, pp. 494-500.

SABATUCCI, R. Sull'anestesia colla scopolamina e morfina. Policlin., Roma, 1906, vol. xiii, sez. prat., pp. 321-323.

SALOMONSOHN, H. Ueber Verwendung 3 proz., Skopolamin-losing zur Pupillinerweiterung und des Yohimbuns als Augenanästheticum. Wochnschr. f. Therap. u. Hyg. d. Auges, Dresd., 1902-3, vol. vi, pp. 217-219.

SHICKLEBERGER, K. Beiträge zur Morphin-Skopolaminnarkose. Wien. klin. Wochnschr., 1902, vol. xv, pp. 1357-1360.

SCHMITZ, ANTON. Die Scopolamin-Morphium-Narkose nach den Erfahrungen an der Freiburger Universitata-Ohren-Klinik. (Freiburg i. Br.) Berl., 1905, O. Franche. 86 p. 8°.

SCHNEIDERLIN. Die Skopolamin (Hyoszin)-Morphium-Narkose. Munchen. med. Wochnschr., 1903, vol. i, p. 371.

SEELIG, M. G. Scopolamine-morphine as an adjuvant in the administration of general anæsthesia. Ann. Surg., Phila., 1905, vol. xlii, pp. 181-187. 1 pl.

SEELIG, M. G. Scopolamine-morphine as an adjuvant in the administration of general anæsthesia. St. Louis Med. R., 1005, vol. lii, pp. 129-133.

SEGELKEN, H. Die Skopolamin-Morphinnarkose in der Augenheilkunde. Klin. Monatsbl. f. Augenh., Stuttg., 1907, vol. xlv, pp. 75-79.

SEXTON, J. C. Death following scopolamine-morphine injection. Lancet-Clinic, Cinn., 1905, n.s., vol. lv, pp. 582-584.

SHARP, H. C. Scopolamine as an anæsthetic, with report of three cases. N. York M. J. (etc.), 1905, vol. lxxxii, p. 1110.

SHOEMAKER, J. V. The practical value of some old remedies: Scopolamine Hydrobromide. N. York J. (etc.), 1905, vol. lxxxii, pp. 749-760.

SHOEMAKER, J. V. The practicafl value of some old remedies: scopolamine hydrobromide. Penn. M. M. J., Athens, 1905-6, vol. ix, pp. 886-889.

SMITH, R. R. Scopolamine-morphine anæsthesia, with report of thirty cases. Detroit M. J., 1906, vol. vi, pp. 73-80.

STEPHENSON, F. T. F. A contribution to the therapeutics of the Scopolamin-Morphin anæsthesia mixture. J. Mich. State M. Soc., Detroit, 1906, vol. v, p. 645. L 610.6157 4 1906.

STOLZ, M. Zur Skopolamin-Morphinnarkose. Wien klin., Wochnschr., 1903, vol. xvi, pp. 1131-1135.

STOLZ. Die Skopolamin-Morphin-Narkose. Monatschr. f. Geburtsh. u. Gynak., Berl., 1904, vol. xix, pp. 743-747.

SUKER, G. F. Scopolamine and morphine anæsthesia in ophthalmic surgery. Medicine, Detroit, 1906, vol. xii, pp. 17-21.

TERRIER, F., AND DESJARDINS, A. La scopolamine comme anesthésique général en chirurgie. Presse. Méd., Par., 1905, vol. i, pp. 137-139.

TERRIER. Note sur un cas d'emploi d'une injection de scopolamine en chirurgie urinaire. Bull. et mém. Soc. de chir. de Par., 1905, n. s., vol. xxxi, pp. 347-349.

TERRIER, F. The use of scopolamine as a general anesthetic in surgery. Internat. Clin., Phila., 1905, vol. xv, s., 2, pp. 228-238.

TOMASINI, S. Sull' agitazione degli alienati e la cura morfio-scopolaminica. Manicomio, Nocera, 1905, vol. xxi, pp. 290-302.

VIRON AND MOREL. La scopolamine morphine comme anesthésique général. Progrès méd., Par., 1906, vol. iii, s., 22, pp. 97-100.

VOIGHT, K. Erfahrungen mit der Morphium-Skopolaminnarkose bei gynäkologischen operationen. Monatschr. f. Geburtsh. u. Gynäk., Berl., 1905, vol. xxii, pp. 805-832.

VOLKMANN, G. Beiträge zur Morphium-Skopolamin-Narkose. Deutsche med. Wochnschr., Leipz. u. Berl., 1903, vol. xxix, Ver.-Beil., pp. 967-969.

VON STEINBÜCHEL. Die Scopolamine-Morphium-Halbnarkose in der Geburtshülfe. Beitrage z. Geburtsh u. Gynäk. Wien, 1903, vol. i, pp. 294-326.

WARTAPETIAN, SERGIUS. Ueber Morphium-Scopolamin-Halbnarkose in der Geburtshilfe. Jena, 1904, A. Kämpfe. Vol. 38, p. 8.

WALTHER, C. De l'anesthésie par le chloroforme après injection sous-cutanée de scopolamine. Bull. et mém. Soc. de chir. de Par., 1905, n.s., vol. xxxi, pp. 614-622.

WEAVER, B. P. Scopolamine in anæsthesia. Fort Wayne M. J. Mag., 1906, vol. xxv, pp. 211-218.

WHITACRE, H. J. Scopolamine-morphine-chloroform anæsthesia. N. York M. J. (etc.), 1906, vol. lxxxiii, pp. 637-641.

WHITACRE, H. J. Scopolamine-morphine-chloroform anæsthesia. Tr. South. Surg. & Gynec. Ass., 1905, Phila., 1906, vol. xviii, pp. 267-281.

WIESINGER. (Erfahrungen mit der Skopolamin-Morphium-Narkose.) Deutsche med. Wochnschr., Leipz. u. Berl., 1904, vol. xxx, p. 1335.

WILD, L. Ueber dir Scopolamin-Morphin-Narkose. Berl. klin. Wochnschr., 1903, 40, 188-190.

WOOD, A. C. Notes on anæsthetics with special reference to scopolamine-morphine anæsthesia. Proc. Phila. Co. M. Soc., Phila., 1905-6, vol. xxvi, pp. 357-368.

WOOD, A. C., JR. On comparative danger of the scopolamine-morphine anæsthesia. Am. Med., Phila. and N. Y., 1906, n.s., vol. i, pp. 546-548.

WOOD, A. C. Note on anæsthetics, with special reference to scopolamin-morphin anæsthesia. Am. Med., Phila., 1905, vol. x, pp. 811-816.

ZIFFER, H. Die Skopolamin-Morphin-Narkose. Ungar. med. Presse, Budapest, 1904, vol. ix, pp. 169-172.

ZIFFER, H. Skopolamin-morphinnarcosis. Szülészet és nógyógy., Budapest, 1904, vol. i, p. 32.

ZIFFER, H. Skopolamin-Morphin Narkose. Monatschr. f. Geburtsh. u. Gynäk., Berl., 1905, vol. xxi, pp. 20-41.

ZINKE, E. G. Report of thirteen cases of scopolamine-morphia-chloroform narcosis. Lancet-Clinic, Cincin., 1905, n.s., vol. lv, pp. 518-521.

De l'emploi de la scopolamine comme anesthésique général en chirurgie. J. de chir. et ann. Soc. belge de chir., Brux., 1905, vol. v, pp. 452-459.

Dangers (The) of scopolamine-morphine anæsthesia. (Edit.) Surg., Gynec. and Obst., Chicago, 1905, vol. i, p. 539.

Scopolamine as an anæsthetic. (Edit.) Med. Rec., N. Y., 1905, vol. lxviii, p. 263.

HEBOSTEOTOMY COMPARED WITH OTHER PROCEDURES IN THE MANAGEMENT OF LABOR IN CONTRACTED PELVES[1]

By PROFESSOR J. PFANNENSTIEL, Kiel, Germany

IN recent years, the management of labor in contracted pelves has entered a new stage through the addition to our obstetrical resources of pubiotomy, or, according to the present generally approved nomenclature, hebosteotomy. The essential advantage of this procedure is that by it it is possible to overcome the obstacles to labor without changing materially the normal course of labor. But the operation has its limits. Hebosteotomy enlarges the transverse diameter of the pelvic inlet on the average 4 to 5 cm., at most 7 cm., and the anteroposterior diameter, 1 cm. or at most 1.5 cm. On the other hand, the pelvic outlet will be increased only about 2 cm. in the transverse diameter, and 0.5 cm. in the anteroposterior diameter. Since a conjugata vera of 8.5 cm. is necessary to the passage of a normal child without serious risk, it follows that with a normal child the pelvic enlargement will be sufficient only when the conjugata vera is 7 cm. or more. In a flat pelvis in which only the inlet is contracted while the outlet is large, one can go somewhat further and employ the operation where the conjugata vera is 6.75 cm. On the other hand, in generally contracted pelves it is important not to go below the limit of 7.5 cm., since in these cases the entire pelvis including the outlet is contracted and the increase in space will not be sufficient to allow the passage of a child of average size. Moreover, there is danger to the mother when this operation is made in case the pelvis is too small, because, with the opening of the pelvis, laceration of the soft parts is apt to occur on account of their attachment to the bones. Especially dangerous is the tearing in a case of generally contracted pelvis because such a patient has, as a rule, a small hypoplastic or infantile vagina and uterus. Here there are apt to be tears of the vagina which communicate with the lesions made in the pelvic bone by the saw and influence unfavorably the outcome for the mother.

Moreover, it should be remembered that all depends upon the relation between the size of the child and the size of the pelvis. Sometimes the opening of the pelvic girdle may be indicated when the pelvis is only slightly contracted (conjugata vera 8.5 cm.). There is no upper limit to the operation.

In the higher grades of pelvic contraction, Cæsarian section is indicated in flat pelves with the conjugata vera under 7 cm., in generally contracted pelves with the conjugata vera under 7.5 cm., in case of a very large child with a conjugata vera of 8 cm.

The results of both operations, hebosteotomy and Cæsarian section, are given by Doederlein in his recent report (Transactions of the Deutsch. Gesellschaft für Gynäcologie, 1907, Dresden).

The mother is exposed to about the same risk in both operations, which show an average mortality of 4 to 5 per cent. Some operators are more fortunate. I, myself, have had 27 hebosteotomies, all recovered. During the same period, the last three years, I have had 15 cases of Cæsarean section, also without a death.

The results for the children are as follows: The infant mortality in hebosteotomy is 7 per cent, in Cæsarean section 1 per cent. I have saved all the children in both operations, although in some cases there were serious complications like prolapse of the cord, threatened asphyxia from other causes, etc.

In order to secure good results, it is necessary:

1. To avoid improper operative attempts at delivery which endanger both mother and child. Particularly should high forceps be avoided.

2. That the asepsis should be perfect, that is, no infection of the obstetrical canal should occur before the operation. If infection has occurred as shown by fever, both hebosteotomy and Cæsarean section should be discarded. The danger to the mother will be increased by

[1] Read before the Chicago Medical Society, May 6, 1908.

the operation while the child for whose rescue the operation is undertaken is also endangered by infection through the mouth, navel, or eyes so that, although born alive, it may die in a few days. Cæsarean section is especially dangerous for the mother in case of fever, on account of peritonitis, but also there is much danger from hebosteotomy after fever has begun. In one case, when fever had begun and when the cord was prolapsed, with dilatation of the cervix of only one finger, I made a vaginal Cæsarean section and hebosteotomy to rescue the child. The child was saved, but the mother was infected and had to remain in bed about four weeks before she recovered.

So we come to the contraindications for the operation. The chief contraindication is the presence of infection, either developed or seriously threatened. We have no right to put the mother in great danger to rescue a child that is perhaps already injured, and this is the case where infection already exists or threatens. In such cases the operations have their place which endanger or destroy the child, such as high forceps, version or perforation, which operations have been largely supplanted by hebosteotomy. Version generally will be impossible since the head is already too firmly crowded into or upon the inlet. On the other hand, high forceps, which in non-infected cases has been substituted by hebosteotomy, is to be considered. Formerly, we were fortunate to have high forceps which saved some children but also destroyed many. While the head remains in its largest diameter above the inlet it is seldom possible to pull it through the pelvis without injury. Hence, we should regard the high forceps only as the last resort to save the child before making a perforation. But this attempt should not be carried too far, for otherwise the soft parts of the mother are endangered by slipping of the forceps, which danger is increased by the existence of an infection. Hence the perforation, even of a living child, remains still a justifiable operation in cases where the mother has fever and cannot be delivered without artificial help.

A further contraindication to hebosteotomy is the refusal of the patient. The consent of the patient to this operation is a matter of course. If the operation is refused, we must consider also the prophylactic methods of delivery, namely the prophylactic version, and when possible, the induction of premature labor. Both operations when properly performed give results much better than reported by some authors. The prophylactic version is a good method in flat pelves of a moderate degree of contraction and a medium sized child. It is a very good procedure in flat pelves of moderate contraction (to 7.5 cm.) and a small child. It is, therefore, very useful in combination with induction of premature labor.

Induction of premature labor gives good results:

1. When it is done at the right time, that is, as a rule not before the 36th week, when of course the relation of the size of the fœtal head to the size of the pelvis is considered.

2. When the pelvis is not too small. Here one should consider the kind of pelvis. Flat pelves generally give good results to 7.5 cm. conjugata vera, generally contracted pelves only to 8 cm.

3. When the proper technique is chosen.

a. In flat pelves dilatation with the metreurynter followed by prophylactic version.

b. In generally contracted pelves use bougie and wait for spontaneous labor as much as possible. Of course, upon indication, extraction is necessary and here forceps gives better results than extraction of the after coming head.

My results in the last three years (in Giessen) are 50 cases without any maternal deaths and with 98 per cent of children born alive. Deducting those children who died in the first days of life, 82 per cent living children were discharged from the hosiptal.

Induction of premature labor is, therefore, absolutely safe for the mother but not for the child. If a woman wishes to be certain of a living child, then hebosteotomy or Cæsarean section is indicated.

Hebosteotomy, like Cæsarean section, should be done only by specially prepared physicians and when possible only in a hospital. Since, in Germany, the obstetrical operations are generally performed by physicians in general practice and not by specialists and since all women cannot be taken to the hospital for delivery, so we teachers in the University are compelled to teach, besides the cutting delivery

operations, also those which endanger or destroy the child and what we teach that we must also show and practise in the clinic. So I practise especially induction of premature labor, and am glad to report satisfactory results. I believe these results can be improved by restricting the indications of premature labor in favor of hebosteotomy.

Concerning the technique of hebosteotomy, the subcutaneous method of Gigli is the best, but one must avoid injury of the bladder and protect other soft parts from injury. I use the following technique which has been published by my former assistant, Professor Kroemer.[1]

On one side, in the groove between the labium minus and labium majus, an incision about 1.5 cm. long parallel to the descending ramus of the pubes is made down to the bone. The soft parts, particularly the crus clitoridis and the soft parts lying behind the pubic bone, are separated partly with a bone-elevator and partly with the fingers. Then a Bumm needle is introduced from below upward to the tubercle of the pubis, the saw attached, pulled through and the bone sawed through subcutaneously. Thereupon, the small wounds below and above are closed with silkworm gut suture and the patient is delivered either by forceps, version, or by foot-extraction in breech presentation. I have given up waiting for spontaneous labor after hebosteotomy, because I consider it better to end the labor, which is always painful to the patient, in the same narcosis. It can happen when one has waited for spontaneous labor that a fœtal indication may demand interference. Not less than four times I have had prolapse and beginning compression of the cord, and three times spoon-shaped impression of the head from the promontory.

Of course one can employ hebosteotomy as a prophylactic measure, as many German obstetricians have done, operating in the second stage of labor when one notices that the head does not enter the pelvis. In such cases, one can wait for spontaneous labor after the operation and lessen the pain of the patient by scopolamine and morphine. But I have learned that such women do not bear down well and that eventually one must assist delivery.

It is very important to protect the soft parts where the divided bones separate. Communications of the wounds are to be avoided. Many obstetricians find hebosteotomy contraindicated in primiparæ on account of the narrowness of the soft parts. I cannot agree with this, since by this rule one robs the mother of a living child. If the soft parts are narrow, and this is the case not only in primiparæ but also in cases of scars in the vagina and particularly in infantile or non-developed vagina, I make a prophylactic perineovaginal incision according to Duehrssen on the same side as the bone incision, because I have found that in this way the bone lesion is best protected. My results have been constantly improved by this method. Not only has there been no fatal case, but the convalescence is much smoother. I can also add that I have had no cases of later disturbance, like hernia, etc.

I am convinced that hebosteotomy is a great advance in obstetrics and that, with proper technique and observance of indication, without increased danger to the mother we will succeed in securing a considerable percentage of children that were lost by our former method of delivery.

[1] Beiträge zur Geb. U. Gyn. Bd. XII, p. 255.

PERFORATING WOUNDS OF THE UTERUS INFLICTED DURING THE COURSE OF INTRAUTERINE INSTRUMENTATION

By AIMÉ PAUL HEINECK, Chicago, Illinois
Surgeon to Cook County Hospital

A. General Considerations. As to Nature. As to Causes — Predisposing, Exciting.
B. Tabulation of All Cases Published in the American, English, French, and German Medical Literatures from 1895 to 1907 Inclusive.
C. Conclusions.

IT is difficult to determine the frequency of this accident. Operators, as a rule, are unwilling to give publicity to such an occurrence happening in the course of their intrauterine instrumentations. In 3172 consecutive autopsies held between February, 1898, and February, 1908, at the Cook County Hospital, not one case of perforated uterus is recorded. In all the cases of abortion and in all the cases of pregnancy treated at the same institution during the years from 1903 to 1907 inclusive (5 years), 495 abortions, 2343 pregnancies, only three perforations of the uterus occurred, 2 died (autopsy denied), one treated expectantly, recovered. By diligently searching the American, English, French, and German medical literatures from the years 1895 to 1907 inclusive, I have been able to collect 160 cases of uterine perforation due to perforating wounds inflicted during the course of intrauterine instrumentation.

GENERAL CONSIDERATIONS

Perforations of the uterus can and do occur with the most startling ease. So as to more intelligently discuss perforations of the uterus, it is convenient to classify them into the true and false (1) perforations.

a. True perforations may be spontaneous, that is, they may occur without the aid of violence; may be secondary or consecutive, that is, they may follow an insult to the uterine tissues, be that insult chemical (2), thermic, bacterial (2), or traumatic in nature. The perforation may follow the insult immediately, or after an interval of time. All uterine perforations due to perforating wounds are true perforations.

b. False or pseudo-uterine perforations are not perforations in fact. We will briefly discuss these pseudo-perforations and then eliminate them from further consideration in this paper. They have caused diagnostic errors. They have caused operative mistakes, such as a needless laparotomy, such as the unfortunate removal of an intact uterus. The term "pseudo-perforation" is used to designate a condition capable of conveying to the operator the impression that he has perforated the uterine wall, when in fact this mishap has not occurred. What then has occurred?

a. The uterine sound or other instrument may have slipped into a double uterus (uterus didelphys) (3). It may have entered a uterus unicornis.

b. The instrument may have slipped into the dilated uterine end of a Fallopian tube (4 *a*, *b*, *c*) (very rare) or into a bicornuate uterus. Watkins (4 *b*) after opening the abdomen found that what he had diagnosed the passage of the curette into the peritoneal cavity was the passage of the currette into the Fallopian tube. In Hind's (4 *c*) case, the uterine sound was introduced before incising the abdominal wall; after opening the abdominal cavity, it was seen that the sound had threaded the whole length of the Fallopian tube. It was presenting at the abdominal orifice of the tube. In Flöckinger's case (4 *a*), laparotomy showed that the uterine sound was in the oviduct. In one of Thorn's cases (4 *d*), one uterus was myomatous, in the other case it was latero-flexed and latero-verted. In the case of myoma of the uterus, the uterine sound was introduced 14 cm.; suddenly, there was a lack of resistance; hasty removal of sound. On opening abdomen, it was seen that the sound had penetrated for 3 cm. in the Fallopian tube. Ahlfeld

(4 *e*) also reports a case in which after laparotomy it was seen that the left oviduct had been entered by a sound first introduced in the uterus. Nevertheless, this occurrence, the introduction by the way of the uterus of any instrument into the Fallopian tubes, is very infrequent, so infrequent that its possibility has been denied by competent observers. 1. Under natural conditions, the lumen of the uterine end of the oviduct is so small that it is only with difficulty that one can introduce a bristle into it. 2. The anatomical position of the tube; and 3. The maintenance (under normal conditions) by the broad and also by the ovarian ligaments of the Fallopian tubes in a transverse position in the pelvis helps to explain the infrequency of this occurrence.

Lawson Tait was never able, on the cadaver, to sound the tubes through the uterus. He maintains that it is not possible to introduce an instrument by way of the uterine canal into the normal Fallopian tubes, under normal conditions. Catheterization of the tubes is more liable to occur in the presence of such pathological conditions as uterine latero-version and latero-flexions, after interstitial gravidity, after hæmatometra, etc.

c. The instrument may have slipped into a small cavity which has developed in the interior of a uterine fibromyoma.

d. The sudden ballooning or relaxation (*a*, *b*, *c*, *d*) of the uterus may also convey to the operator the impression that he has perforated the uterine wall. There is such a condition as atony of the uterus. The fact that at all periods of sexual life the uterus has the property of alternate contraction and relaxation, is regarded as proved by all physiologists. Contraction and relaxation are properties inherent to all muscular tissues, and the uterine muscularis is not an exception to the general rule.

During curettage, one often notices a uterine lengthening of 1, 2, or 3 cm. It is no longer claimed, just because the curette in these cases is not kept in constant contact with the uterine wall, that such uterine lengthenings are instances of perforations. They are evidences of uterine relaxation. The system of uterine blood-vessels is adapted to these expansions and contractions of the uterus.

R. DeBovis in *La Semaine Médicale*, Paris, 1906, vol. 26, p. 253, has an excellent and exhaustive article on pseudo-perforations. Though this condition is infrequent, its existence can no longer be denied. In the case reported by N. Gheorghiu (5), the removed uterus showed no trace of a perforation. In Craig's (6) case, the operator, supposing that he had perforated the uterus, opened the abdomen. He then found the uterus to be uninjured absolutely. Kossman (1 *b*) bears witness to similar facts.

Perforating wounds of the uterus, especially of the gravid uterus, can be inflicted from above (7); can occur during the course of a laparotomy; can be associated with penetrating wounds (gunshot wounds, stab wounds, and similar injuries) of the abdominal wall, of the gluteal (8) and of other regions; can occur during the course of delivery.

Wounds so inflicted, though they involve the same organ, though they extend also through the entire thickness of the uterine wall, demand, owing to their method of infliction, owing to their portal of entrance, owing to their invariable association with serious visceral and other injuries, to be considered separately from the wounds that form the subject-matter of this paper.

We will consider in this article only such perforating wounds of the uterus as are due to violence inflicted from within the uterine canal, that is, only those perforating wounds in which the vulnerating agent has either been introduced through or traversed the uterine cervical canal before perforating the uterine wall. The element of trauma is essential, is indispensable to an accurate conception of these perforations.

In the course of intrauterine instrumentation, diseased and healthy uteri, cases (32 *b*) 57, 97, 100, 101, 99, 98, etc., have been perforated and most disastrous results have ensued. Wounds of the uterus are, like wounds of other organs or other tissues, solutions of continuity, always of sudden occurrence, and always due to the direct application of mechanical violence.

To avoid misunderstandings, a distinction must be made between penetrating and perforating wounds of the uterus. The former

only enter the uterine wall, the latter traverse its entire thickness.

Therefore the distinctive characteristic of perforating wounds of the uterus is that they involve the entire thickness of the uterine wall. All the coats, or rather layers, of the uterus are interested, the mucosa, the muscularis, and the serosa (in those portions of the uterus that are covered by peritoneum).

The uterine perforations discussed in this article were always consecutive to some intrauterine maneuver and always immediately so. In this class of uterine wounds, the vulnerating agent establishes a direct communication between the uterine and some adjacent cavity; the peritoneal cavity (10) most always; rarely the vaginal (cases 62, 69, 145) or the vesical cavity (case 84); still more infrequently, the lumen of the gut. In other cases, the perforating instrument, after having pierced completely through a portion of the uterine wall not covered with peritoneum, enters the perituerine connective tissues, penetrating between the folds of the broad ligament (9) (parametrium) (cases 73, 110, 146). If the violence still continues to act, the vulnerating instrument may perforate one or both layers of this ligament and thereby enter the peritoneal cavity (cases 55, 65). The perforating instrument may enter the vesicouterine space (case 142), may enter and lodge in the space of Retzius, (case 78), may enter and lodge in Douglas's cul-de-sac, (case 100).

Traumatic perforations can involve any portion of the uterine wall. In my two cases (28 and 43) the perforation, as is usual, as is most always the case, involved the posterior wall; in Van Ripper's case (48) the rent was in the anterior wall; it extended from the fundus uteri to near the vaginal vault. In Harris and Whitney's case (case 135), the anterior wall showed a transverse rent, about 1½ inches in length. In case 97, the uterus was perforated from horn to horn and the perforation was filled with omentum. In case 110, the perforation was situated at the anterior and left lateral surfaces of the supravaginal portion of the cervix. In case 18 the perforation was also in the anterior wall.

The perforations may be in the cervix uteri, as in cases 56, 62, 69, 145; may be in the corpus uteri, or may involve both corpus and cervix; may be single, may be multiple (they are most usually single); may be small, may be large, as in case 121, in which the midwife produced a uterine rent 2 cm. long. In Ulmann's case (case 118) there were two perforations. In Schenck's case, (case 94) there were three. In Werelius's case (case 139) the uterus contained 7 punctures. The perforation may be barely visible, in one of my cases merely a subperitoneal ecchymosis was present; may be large enough to permit the escape of a large portion of omentum and of intestines through the rent, as in Hessert's case (63) four feet of gut had been pulled through the uterine rent; as in Holmes' case (123), in which the intestines were found between the woman's legs; as in Congdon's case (153), in which the operator had pulled 40.5 cm. of intestines into the vagina and twisted it off. All of these cases recovered. In case 46, which died, the operator kept on pulling intestine through the perforation until he had drawn out 6 feet, which he cut off. A perforation may be large enough to allow the escape of the fœtal head into the abdominal cavity (case 8); may allow the escape of the fœtus into the peritoneal cavity, as in Whitney's case (135). In Tait's case (No. 1), nine months after the perforation, the track of the curette could still be seen. The size and the shape of the opening are to some extent dependent upon the size and the shape of the vulnerating instrument.

The perforation may lead to the formation of a permanent abnormal channel of communication between the uterine and an adjacent cavity, as in Dr. Lobdell's case (84), in which the perforation of the uterus took place directly into the bladder, and a permanent vesicouterine fistula resulted; may lead to a permanent prolapse of a portion of omentum, into the uterine cavity, (cases 14, 15). Usually the vulnerating agent is removed after the infliction of the perforation. In some of the tabulated cases, exceptional cases, I admit, it was abandoned in place and was either expelled per vaginam or eliminated by the aid of a slowly ulcerative, suppurative, or other pathological process through newly created avenues. The perforating body may be eliminated through the rupture of a near or of a distant

abscess, or may be removed at operation (cases 51, 60, 73) or at autopsy. In one of Treub's cases (99) the bougie was embedded in a retrouterine abscess. In his other case (78) he removed, by an incision, the perforating catheter, from the space of Retzius. In Johnson's case (98) the patient was laparotomized and the bougie, cause of the perforation, had been almost entirely folded in and covered by omentum in the effort of nature to repair the damage and to prevent injury of the abdominal viscera. In Thorn's case (100) the perforating bougie, after the patient had been laparotomized, was found lying obliquely in Douglas's cul-de-sac. In Talmey's case (101) the perforating bougie was found lying in front of the proximal edge of the right kidney.

In Bullard's case (152) the crochet-hook was discharged through the anterior abdominal wall. It did not interfere with the continuance of gestation. In Perl's case (121). the needle or trocar that had been used was removed sometime after, from an abscess in the right inguinal region, where it had become encysted after its passage through the uterine wall. In Fairchild's case (147), at the laparotomy, the hairpin, cause of the perforation, was found high up in the abdominal cavity, near the diaphragm. In Patru's case (73), the perforating catheter was embedded in an abscess which could be palpated through the anterior rectal wall. An incision was made and the bougie removed. In Marchand's case (50) a Hegar's metallic dilating bougie, No. XII, perforated the uterus and was abandoned in the patient's body. After about a year of invalidism, she was laparotomized and the sound was found between the two folds of mesentery. Recovery.

Any instrument that can be used or misused in the uterine cavity is capable of perforating the uterine wall. All forms of uterine sounds, of uterine dilators, of curettes, the St. Cyr augur (cases 26 and 34) curette included, can be incriminated. In case 34, thirty-one inches of gut had been torn away by the augur curette.

In our series, it is stated in unmistakable terms that the vulnerating instrument was:

1. Uterine douche tube, irrigator, catheter, 12 cases.
2. Uterine bougie, uterine sound, 17 cases.
3. Uterine dilators, 31 cases.
4. Uterine curette, 44 cases.
5. Miscellaneous, 50 cases.

The offending agent in some of the cases happened to be either a probe, case 151, a wire, case 147, a meat skewer, case 150, or an electrode, case 148.

Perforating wounds of the uterus are always of accidental occurrence. Nowadays, they are never intentionally inflicted. They have occurred in the hands of the most clever operators. The accident has occurred to Lawson Tait, case 1; Auvard (11) (Paris) had one perforation in 270 curettements. It cannot be stated that they are always due to ignorance, to incompetence, or to carelessness. It can be said, however, that all intrauterine instrumentations are dangerous in the hands of the novice, in the hands of the careless, in the hands of the surgically unclean. It can also be stated that in most of the cases where death has followed upon uterine perforation, the perforating instrument had been introduced for criminal purposes. In 26 of the cases reported at the close of this article, the perforating instrument had been introduced to end an undesirable pregnancy. In some of the cases, in which the perforating instrument was not introduced for criminal purposes, it had been guided by unclean hands.

In 1873, L. E. Dupuy (12) said: "I have found 17 cases reported in which the uterine wall has been perforated from within. In some of these cases the uterus had been perforated at more than one place. All these patients made uneventful recoveries, in none were any measures taken either before or after the accident to prevent the development of complications." In 1878, Carlo Liebman (13 *a*), in reporting two cases of uterine perforations treated expectantly and terminating in recovery, reviewed the subject quite exhaustively. In his article, Liebman makes the following statement: "In not one of all the cases reported in the medical literature, and they exceed thirty in number, was the perforation of the uterine wall followed by alarming symptoms." He compares the accident to paracentesis and exploratory punctures, procedures which are generally considered harmless.

Lawson Tait (13 *b*) had never seen any ill result follow perforation of the uterus by a uterine sound. Lenoir (13 *c*) says: "These perforations have appeared interesting to us not only on account of their frequency but also on account of their innocuousness." These authors concluded, from their study of the literature and from their personal experience, that perforated wounds of the uterus are relatively benign, are unattended with danger. Their opinion is erroneous and is completely disproved by the perusal of the tabulated cases that are to be found at the close of this article.

The dangers of perforating wounds are manifold. Independent of the danger of shock, there is the danger of hæmorrhage into the pelvic and general peritoneal cavity, into the pelvic connective tissues and other areas. There is the great danger of infection,—of infection of the uterus, of infection of the pelvic connective tissue, of the peritoneum, of the intraabdominal organs. In 23 of the fatal cases, it is definitely stated that a diffuse suppurative peritonitis was present. There is the danger of traumatizing the intestines, the omentum. In 35 cases, it is stated that positive injury was inflicted to the intestines or omentum. Any one of these dangers can prove fatal. In Donald McCrae's case (57), the patient bled to death. She died three hours after the infliction of the perforation. The uterus showed practically no pathology. Several months before the patient had had a miscarriage. Twenty-eight inches of intestines were pulled off by actual force.

Shock, hæmorrhage, visceral injuries, and infection may be associated in the same individual case. If a large tear has been made in the uterus, there is danger of a loop of intestine or of a part of the omentum slipping into the rent and becoming strangulated (cases 48, 136). The gut may only be incarcerated, not strangulated, in the rent (case 112). In Küstner's cases (14 and 15), the omentum escaped into the uterine cavity. Following these two (Küstner's) unrecognized perforations, prolonged and irregular uterine bleeding occurred. Eventually, vaginal hysterectomy was done in both cases, and on section, each uterus was found to contain grape-like pieces of omentum. The omentum may plug the uterine perforation (cases 131, 97). In cases of perforation of the posterior wall of the uterus near the fundus, if the omentum hangs low into the pelvic cavity, it is very liable to become entangled in the curette and drawn through the perforation into the uterine cavity, even into the vagina. If the patient recover from the perforation, the scar at the site of the cicatrix apparently does not interfere with the subsequent development of pregnancy, does not add to the dangers of a subsequent pregnancy, as evidenced by cases 21, 37, 49, 63, 131, 138. In case 131, the site of perforation was sought after delivery in a subsequent pregnancy. No trace of it could be found. Höncks case (153) is the only case reported in which the perforation is said to have enlarged at a subsequent pregnancy and to have complicated delivery.

How can the frequency of these perforations be lessened? How can their morbidity and the mortality incident to their occurrence be lessened?

A. By the non-employment of inappropriate or of defective instruments.

B. By never entering the cavity of the uterus in the absence of indications.

C. By never entering the cavity of the uterus in the presence of contraindications, such as pus in the tubes, in the ovaries, or around the uterus; in acute gonorrhœal endometritis, in acute septic endometritis, etc.

D. By perfecting our surgical technique.

E. By familiarizing ourselves with the conditions that predispose to the occurrence of uterine perforation; in a few words, by keeping in mind in connection with intrauterine work that there are dangerous instruments, dangerous uteri, dangerous maneuvers. For instance, in removing pedunculated uterine submucous fibroids, the peritoneal cavity is liable to be opened, as in cases 104, 111.

The use of placental forceps in the uterus is always dangerous. It is needless, as the finger can do more intelligent work. Even the finger has difficulty at times in differentiating between placental tissue, blood-clot, and intestines. The uterine sound or hysterometer is an instrument of very little usefulness; in most cases the size, the mobility, and the position of the uterus can be better and more safely determined

by bimanual vaginoabdominal examination. Laminaria tents (14), if employed to dilate the cervical canal, should always be as long as the uterus, otherwise the lower end of the laminaria, instead of remaining a little below or flush with the external os, is liable to slip into the uterine cavity. Should then the long axis of the laminaria not remain exactly in that of the uterine cavity, the lower end of the tent becomes impinged against the uterine wall. The uterine contractions may drive that end partly or entirely through the uterine wall. The use of laminaria tents produces a more gradual dilatation of the cervical canal. This is an advantage which, in our opinion, is counterbalanced by the fact that the patient has 16 or 24 hours of pain. We believe that tupelo tents can with advantage be banished from the gynecologist's armamentarium. The danger of infection from the use of tents is great (Dudley, Chicago). The three-bladed steel uterine dilator is considered dangerous.

It has been nicknamed the "perforating dilator." Its use is to be discouraged. Hegar's graduated metallic dilating bougies are serviceable instruments. They should not be introduced much beyond the internal os. Their function is to dilate the cavity of the cervix uteri, not that of the corpus uteri. It would be advisable that they be marked off in centimeters, so that the operator would know at all times how deep they are introduced.

As to uterine curettes, there does not seem to be any pattern which cannot, suitable conditions being present, determine a perforation of the uterus. The blunt and the sharp, the fenestrated and the non-fenestrated, and even margined, and the sinuous margined curettes are each reported as having perforated the uterine wall. It is better to use a curette, the shank of which may be bent like a probe so as to be made to conform to the direction of the uterine canal. A curette which is pliable and curved and broad above is less liable to cause perforation than one which has a narrow upper end and which is rigid and straight. Some models of fenestrated curettes are very apt to catch muscular tissue.

The introduction of the finger or of instruments into the uterine cavity should not be regarded lightly. With but few exceptions, all these perforations have occurred during the operations of dilatation of the cervical canal or during that of curettement of the uterine cavity. These two operations, cervical dilatation and uterine curettage, are relatively of great simplicity of technique, of great benignancy, and of great efficacy, when performed with due precautions as to asepsis, as to preoperative preparation of the patient, such as emptying of the lower bowel and catheterization of the urinary bladder. They should not be performed indiscriminately. They are better performed with the aid of an assistant.

The indications for dilatation of the cervical canal are:

1. As a preliminary measure to (*a*) intrauterine exploration; (*b*) uterine curettage and other intrauterine maneuvers.

2. As a therapeutic measure in dysmenorrhœa.

Dilatation or divulsion alone is not to be considered a specific for dysmenorrhœa. A considerable number of cases of dysmenorrhœa are not in the slightest degree benefited by this operative procedure. In the marked dysmenorrhœa at times associated with uterine anteflexion, Dudley's operation for anteflexion will be found very serviceable. In dysmenorrhœa due to stenosis of the external os, Pozzi's operation is valuable. Dilatation alone is valueless in the treatment of dysmenorrhœa due to any of the various malpositions of the uterus. We must treat the cause or causes which determine the occurrence of the symptom dysmenorrhœa.

The indications for uterine curettage are:

1. To remove placental debris, etc. In this connection, let us state that in the opinion of such men as Coe (16), Pinard, etc., the aseptic finger is the best instrument to introduce into the puerperal uterus for the purpose of removing decidual remnants and blood clots. Pinard rejects the use of the curette, and teaches that in all cases of retained secundines, the finger should be employed. He considers it safer and more thorough. There are limits, however, to the power of the human digits, and at times the curette will be found a valuable auxiliary to the finger. For the

exploration of the uterine cavity, the finger, by virtue of its tactile sensibility, is far superior to any instrument (17). The curette is a blind agent. (Lepage, Pinard, Budin.)

2. As an aid to diagnosis, as in decidual endometritis, tubercle, carcinoma, chorion-epithelioma, and other intrauterine growths. The use of the curette as a diagnostic aid is a recognized and sanctioned procedure.

Where carcinoma of the corpus uteri is suspected, the curette must be used with great caution, and only to remove small pieces for diagnosis. Again, in these cases where curettage has been previously performed, great care is necessary, because it sometimes happens that the uterine wall has been deeply scraped, and then the danger of perforating it is imminent. (Cases 35, 62, 67, 88.)

3. Removal of abnormal endometrium, causing dysmenorrhœa and sterility; to induce involution of the uterus. Clinicians differ as to whether it is wise to curette an empty septic uterus following on labor or abortion. Naturally, if the uterus contains retained placental tissue, this must be removed. If the curette is used, venous sinuses and lymphatics are reopened, and the protecting barrier of leucocytes is interfered with and opened and possibly removed in places. Further, the Fallopian tube may also become infected.

4. To remove the remains of a mole pregnancy.

5. In the treatment of inoperable carcinoma of the cervix, where septic absorption is one of the common causes of immediate distress, curetting the fungating mass and subsequent treatment of the raw surface with strong formalin, frequently does away with sepsis, hæmorrhage, and pain.

C. What are some of the contraindications to utero-cervical dilatation and uterine curettage?

a. The absence of a positive indication.

b. The presence of pelvic suppurative processes, either in the uterus, in the uterine adnexæ, or in the parametrium.

c. The presence of such conditions as phlegmasia alba dolens, of uterine or of periuterine thrombophlebitis. The curette is liable to disturb the thrombi in the uterine veins, at the placental site, or in the plexus pampiniformis. (Byron Robinson.) (15.)

D. By perfecting our surgical technique, the occurrence of this accident, perforation of the uterus, will become a rarity.

Before undertaking any intrauterine maneuver, determine by (*a*) vaginal examination; (*b*) bimanual, vaginoabdominal examination.

1. The presence or absence of adnexial or periadnexial disease. Curettement has determined the rupture of tubal, ovarian, periovarian, and periuterine pus collections. Even the pulling down of the cervix to the vulvar outlet by tenacula has ruptured pus collections.

2. The size, the shape, the mobility, and the consistency of the uterus. If the uterus be bound down or be immobile, as a result of adhesions due to previous pelvic inflammatory processes, it is far more liable to be perforated. Under such conditions, it does not yield to the impact of the uterine instrument, it does not accommodate itself to the pressure exerted by the sound, curette, etc.

3. Get as clear as possible a mental picture of the pelvic organs. Having a definite mind-picture of the pelvic conditions existing in the individual case, if uterine perforation occur, it is more immediately recognized and one desists from further uterine instrumentation. For instance, suppose that in a given case the uterus has, by examination, been determined to be normal in size, in volume, and in position, and that during the introduction of the uterine instrument the latter slips much to one side of the median line and to a depth greater than that of the uterine cavity, perforation will then be immediately diagnosed.

4. The presence or absence of tumors upon or within the uterus.

5. Some operators further recommend that the depth and the direction of the uterine cavity be determined by the careful use of the graduated uterine sound or by the hysterometer, and that any deviation from the normal be noted. Many operators condemn the use of the uterine sound or hysterometer as a means of ascertaining the depth and direction of the uterine cavity. They rightly claim that the same information can be more safely determined by the bimanual vaginoabdominal examination. The field of usefulness of the uterine sound is very limited.

In case 86, the uterus was anteflexed; in cases 39, 58, 74, 85, 89, it was retroflexed; in case 84, it was retroverted; in case 53, anteverted; in case 11, lateroverted. All malpositions, congenital or acquired of the uterus, if unrecognized, predispose to perforation during the course of intrauterine maneuvers. Malposed uteri are most frequently perforated opposite the point of angulation. The nutrition of the uterine tissues being impaired at the point of flexure, explains the not uncommon occurrence of perforation also at this point. In a retroflexed uterus, the anterior wall is the one which is the more liable to be perforated; in an anteflexed uterus, the posterior wall.

6. Observe the most rigid asepsis during the course of the operation, and see that from the standpoint of asepsis and antisepsis the patient has been prepared as carefully as though you were going to perform a laparotomy. In uterine wounds, be they inflicted by the sound, by the uterine dilator, or by the curette, you must minimize, you must avoid the liability of implantation of infection. Not much can be done to cure existing infection. Much can be done to prevent the occurrence of infection. The endometrium sits directly on the myometrium with no intervening submucosa to check endometrial infectious invasion.

Chief among the pathological states that predispose to the occurrence of perforating wounds of the uterus are the following :[1]

a. The changes (hyperæmia, softening, etc.) present in menstruating, in pregnant, in puerperal, and in post-abortum uteri. Perforation is favored by the peculiar state of the muscular tissue of the puerperal uterus. In curetting congested, softened uteri, such as are met after abortion and after childbirth, no attempt should be made to elicit the uterine "cry" (le cri utérin) (20), that is, the peculiar creaking noise due to the forcible scraping of the uterine wall by the sharp curette. Owing to the softness and friability of the uterine wall in these cases, this sound is not obtainable.

Perusal of the tabulated cases at the close of this article discloses that 14 puerperal uteri were perforated, 7 deaths resulting; that either in the attempt at abortion, or in efforts to overcome some of the accidents following abortion, the uterus was perforated 65 times, 25 deaths resulting. After delivery at term, the thickness of the muscular wall according to Tarnier is from 2 to 5 mm. (19).

b. Atrophy of the uterus (21). All the different forms of uterine atrophy of themselves cause a weakening of the uterine wall, and therefore can be looked upon as conditions predisposing to uterine perforation. Atrophy of the uterus has been observed in some chronic diseases, as in pulmonary tuberculosis, occasionally in diabetes, in leukæmia, in chlorosis, in pernicious anæmia, in Addison's disease, in Basedow's disease, etc. It is stated that also in certain acute infectious diseases, such as typhoid fever, a marked atrophy of the muscular tissues is noted.

We will enumerate the main histo-anatomical changes that have been noticed in senile atrophy of the uterus and those found by Emil Ries (Chicago) in some cases of extensive atrophy following puerperal infection.

The changes found in senile uteri are:

a. Atrophy of the mucosa and of the muscle fibers.

b. The relation, in amount, normally existing between the connective tissue and muscular tissue is altered considerably at the expense of the latter.

c. Vessels are sclerosed. Case 1 was a senile uterus. It was also the seat of myomata.

Emil Ries (Chicago), in some cases of extensive atrophy of the uterus following puerperal infections, found

a. Absence of mucosa.

b. Hyaline degeneration and thrombosis of of the vessels.

c. Degeneration and necrosis of the muscularis.

C. Malignant neoplastic disease of the uterus.

The cases of a carcinoma or sarcoma of the uterus are numerous in which perforation of the uterus has resulted from slight mechanical stress. Efforts in the presence of malignant disease of the uterus to obtain material for microscopical examination, if brutal, may prove disastrous. Malignant disease of the uterus may give rise to spontaneous perforations (23).

[1] There are other unusual pathological states of the muscular uterine wall that predispose to perforation, such as for instance existed in Halban's (38) case No. 61, and others, which the lack of space forbids us to discuss.

d. Inflammatory processes of the uterine tissues may be localized; may be diffuse. Like inflammatory processes elsewhere, they are destructive in nature. Whatever be the nature of the inflammation, acute or chronic, or the site, be it located in the mucosa, in the muscularis or in the connective tissue, it invariably weakens the resistance of the uterine wall. Case 91 was a case of myometritis œdematosa; case 3, a case of endometritis fungosa. In case 54, sutures from a previous operation were suppurating their way through the uterine wall.

Prolonged septic processes predispose to uterine perforation. Tubercular uterine inflammation by leading to abscess, to cavity formation, can of itself cause uterine perforation. Inflammation of the uterus may terminate in resolution, in ulceration, in suppuration, or in gangrene. We will briefly consider abscess (24 *a*, *b*, *c*, *d*) of the uterus and also gangrene of this organ, as several instances will be found in our tables where these conditions, either together or separately, were present. The occurrence of abscess of the uterus is no longer contested, as many of the cases reported have been amply verified (25, 26, 27). Uterine abscesses may be acute, subacute, or chronic; may be primary or secondary; in the primary form, the pus collection has its starting-point as such in the uterine tissues; in the secondary form, the suppurative process starts in neighboring tissues and invades the uterus by extension through contiguity of tissues. In the first form, at the beginning, if not throughout its entire course, the pus collection is entirely circumscribed by uterine tissue; in the secondary form, it is partly surrounded by the uterine tissue, partly by other tissues.

In number, these abscesses may be single, may be multiple. In location, they are either submucous, intramuscular, or interstitial, or subperitoneal. Their site may be in the anterior wall (27), may be in the posterior wall (26). Uterine abscesses are always due to infection, a pathological, surgical, or traumatic solution of surface continuity of the uterine mucosa serving most frequently as the portal of infection. Any pyogenic organism, facultatively or habitually so, can be the causative germ. Tubercular abscesses have been reported. In Menge's case (24 *b*) gonococci were detected in the pus. However, the ordinary pyogenic cocci are the most frequent offenders. The germs are either implanted in the uterine tissues by a vulnerating instrument or may be conveyed to the site of abscess development by the lymphatic vessels. Rarely the abscess is embolic. The abscess may be secondary by contiguity of tissues to an infective uterine thrombophlebitis (infective thrombophlebitis), suppurative thrombophlebitis, abscess. The liability to the latter occurrence during the post-abortum and post-partum period is well known.

All uterine abscesses impair the solidity of the uterine wall. They predispose to traumatic perforations, as the abscess-site forms a circumscribed area of lessened resistance. They may rupture spontaneously into the rectum (Bird's case, Schroeder's case), into the bladder (Berrut's), into the uterine cavity, into the peritoneal cavity, etc. They may give rise to spontaneous perforations, as when the abscess ruptures both into the uterine cavity and into an adjacent cavity or space. We have in the case reported by Porak (25) an instance of spontaneous uterine perforation due to an abscess. This was a case of puerperal sepsis. The uterus contained several abscesses, one of which had ruptured both into the uterine and into the peritoneal cavities. In one of Mauclaire's cases, at the seat of perforation there was an abscess which had extended nearly to the peritoneal coat.

Another possible termination of inflammation which predisposes to perforation is gangrene. Uterine gangrene may be circumscribed, may be general, may involve the entire thickness of the uterine wall, may involve only a part of its thickness, may be due to traumatic, inflammatory, neoplastic, or to chemical causes. It may be secondary to criminal or other intrauterine maneuver, it may be spontaneous. Gottschalk reports a case of gangrene of the uterus (puerperal sepsis) in which the necrotic tissue represented the whole uterine mucous membrane and a portion of the muscular walls. He thinks that in this case the gangrene was due to intrauterine injections of 60 per cent alcohol. Other similar cases are reported.

Gangrenous metritis is a condition which predisposes to traumatic uterine perforation which may result in spontaneous perforation. Beckman (St. Petersburg) noted this grave complication six times in forty cases of metritis dissecans. Metritis dissecans is a condition which we now designate as gangrenæ uteri puerperalis. It may be partial, it may be total, it may be perforating. On examining the organ, it is at times difficult to determine if the perforation is secondary to the gangrene or if the gangrene is secondary to an inflammation started by the instrument which has perforated the uterus (30). In Winter's case (31), the gangrene was secondary to a perforation consecutive to abortive procedures. In the tissues surrounding the perforation, which was located on the posterior wall, there was a marked predominance of saprophytic germs. The inflammatory gangrene enlarges the traumatic lesion, and may lead one to think that the perforation is spontaneous in origin. Maygrier (32) reports two cases of post-abortum gangrene. Each had led to a uterine perforation. Trauma as a factor was absent in both. K. Schmidleschner (29) reports a case of gangrenæ uteri puerperalis involving the entire cervical wall and the lower one-third of the muscular wall of the body of the uterus.

CONCLUSIONS

1. Pseudo-perforation of the uterus, though of exceptional occurrence, is a clinical condition.

2. Spontaneous perforations of the uterus, due to pre-existing pathological conditions of this organ, can and do occur.

3. Perforating wounds of the uterus, be they intraperitoneal, be they extraperitoneal (there were 12 such in the cases reported), have a morbidity, have a mortality. This morbidity, this mortality, increases in direct ratio with the inexperience, the carelessness, the surgical ignorance, and the surgical uncleanliness of the operator. The expert recognizes at once the making of a false passage and institutes proper treatment. High surgical skill may convert (as consultation of the tables at the close of this article amply demonstrates) an apparently hopeless case into a recovery. In the 154 tabulated cases, there were 42 deaths, 108 recoveries. The result is not stated in 4 cases. Expectant treatment was pursued in 66 cases. There were 21 deaths in this series. Laparotomy, including what intraabdominal repair work appeared necessary to the operator, was performed 72 times. There were 52 recoveries, 17 deaths, and 3 unstated results in this series. Vaginal hysterectomy was done 15 times. There resulted 10 recoveries, 4 deaths, and one result not stated.

4. Dilatation of the cervical canal and instrumental curettage of the uterine cavity are, owing to their associated dangers, not office operations. During the performance of these two operations, the operator may be confronted by accidents, the meeting of which requires the highest surgical skill. In their performance, if an anæsthetist be available, the employment of general anæsthesia, in the absence of contraindications, is highly desireable. In fact, the rule should be: 1. No uterine curettage without surgical general anæsthesia. It is easy to conceive how a non-anæsthetized patient can by injudicious jerks or movements perforate her own uterus, by impaling it, by spiking it upon the intrauterine instrument. Anæsthesia permits the operator to depress the abdominal wall, to locate, and to fix if necessary, the fundus uteri. 2. No curettage without ample cervical dilatation. A non-dilated cervical canal interferes with the tactile sense, and thereby with the proper maneuvering of intrauterine instruments. Steady the cervix before beginning the dilatation of the canal.

5. Intrauterine instrumental maneuvers should be attempted only by those: *a.* Who are thoroughly conversant with modern surgical asepsis and antisepsis. The absence of bacteria on the perforating instrument minimizes very much the dangers of perforation. Infection has immediate, has late dangers. In an uncomplicated perforating wound of the uterus, the traumatism of the uterus plays but a secondary rôle; the pre-existence or the implantation of infection commands the situation. *b.* Who are capable of recognizing malpositions of the uterus and pathological conditions of that and of neighboring organs. Even the bringing of the cervix to the vulvar outlet may disturb peritoneal adhesions, may rupture pus pockets. *c.* Who are acquainted with the treatment of the dangers incident to the succes-

sive steps of the intrauterine operation which they are performing. The steel dilator is an instrument of too much power and the curette is too dangerous a weapon to be used by the novice, by the inexperienced.

6. Once the uterus is perforated, all further intrauterine instrumentation must be suspended. If it be imperative that the contents of the uterine cavity be removed, this must be done by digital curettage, or it may be done with a curette, while the uterus is being watched from above through a laparotomy incision.

7. A perforated uterus should never be swabbed or mopped with caustics or irritating antiseptics. It is needless, it is dangerous. In two cases (141, 152) it is distinctly stated that the uterine cavity was swabbed. Both cases died. In each, carbolic acid was the agent used.

8. A perforated uterus should never be irrigated. In 17 cases in which it is stated that the uterus was irrigated during the course of perforation or afterwards, there were 6 recoveries (cases 49, 75, 80, 85, 86, 92) and 11 deaths (cases 5, 16, 17, 20, 24, 77, 82, 83, 102, 128). In two of the recoveries (cases 75, 86), convalescence was delayed by mercurial poisoning due to the sublimate solution that had been used for uterine irrigation. In case 80, one ounce of 1 per cent aqueous solution of creolin entered the peritoneal cavity. Brothers, in his report of case 20, in which the perforated uterus was irrigated, states: "I have never seen a picture of greater physical suffering in my life." The great danger attending intrauterine irrigation in these cases is the conveyance, the diffusion by the irrigating fluid, of septic material from the uterine into the peritoneal cavity or other space. Owing to the great absorptive power of the peritoneum, the danger of chemical intoxication is also present. Every case, in which it is definitely stated that the perforated uterus was not irrigated, recovered (1, 4, 6, 21, 22, 23, 25, 27, 28, 31, 39, 43, 44, 47, 103, 108, 126, 138, 144).

9. Vaginal hysterectomy is an operation not to be performed in the treatment of perforating wounds of the uterus. It calls: 1. For the sacrifice of an organ which may not be perforated; 2. For the sacrifice of an organ which, though perforated, most always can be, with little difficulty to the operator and with much advantage to the patient, saved; 3. It does not enable the operator to either exactly determine the presence or absence of coexisting intraabdominal vascular, visceral, or other lesions, nor does it enable him to repair them.

10. If the perforated wound has been inflicted upon a non-septic uterus during the course of an aseptic intrauterine maneuver, in the absence of complicating abdominal lesions, recovery is the rule.

11. The treatment of perforating wounds of the uterus is determined largely by the following conditions: 1. The septicity or asepticity of the uterus and its contents; 2. The septicity or asepticity of the perforating instrument; 3. The presence or absence of coexisting vascular, omental, or intestinal lesions; 4. The size of and the number of the perforations. A piece of omentum may prolapse through a large rent. A coil of gut may become incarcerated or strangulated in a large perforation.

12. Treatment. *a.* If the uterus be nonseptic, if the perforating instrument be aseptic, and it can also reasonably be assumed that there is an absence of omental or intestinal or important vascular lesions, the treatment to be followed is one of armed expectancy. The patient must be confined to bed and immobilization enjoined for at least three days. The patient's pulse, temperature, facies, and abdomen must be carefully watched. A suppurative peritonitis, circumscribed or diffuse, a suppurative cellulitis, signs of internal hæmorrhage, etc., call for intervention. A wick of gauze may be inserted into the uterus, but it should not be introduced much beyond the internal os. *b.* In all cases in which there has been a prolapse of the omentum, or of the intestine into the uterine cavity, in all cases in which associated injuries to the intestines or omentum co-exist, or in which there are reasons to fear a significant internal hæmorrhage, laparotomy is urgent. *c.* Once the abdominal wall has been opened, the visceral lesion must be repaired. The uterine puncture, if not small, need not be sutured. If large (when the perforation is large you cannot depend upon the contractility of the uterine muscle to entirely occlude it,) if of the nature of tears, of lacerations, it is better that they be sutured.

In the following cases the operators deemed it wise to suture the perforation: 23, 29, 30, 32*a*, 32*b*, 42, 58, 64, 72, 79, 95, 103, 107, 124, 131, 132, 136, 138. All these cases, excepting cases 32, 107, and 136, recovered. In each of these three fatal cases, there were complicating intestinal lesions necessitating resection of gut and enterorrhaphy. Some operators, as Jarman (case 124), made use of both superficial and deep sutures for closure of the uterine rent. One or two layers of sutures may be used. Whether small or large, if the perforation be the seat of hæmorrhage, it should be sutured. Some clinicians recommend laparotomy for all intraperitoneal perforations, and base their teaching upon the following considerations: *a*. That the exact size of the perforation is not definitely known; *b*. That hæmorrhage may be taking place from the peritoneal surface of the wound; *c*. That in the absence of a laparotomy we can never tell with certainty whether any intraabdominal organ is injured.

13. A healed perforation of the uterus apparently does not interfere with the normal development and termination of a subsequent pregnancy. In Dr. Werelin's case, in which twelve feet of intestine were removed and in which uterus had been perforated seven times, patient subsequently went through two pregnancies; in one abortion resulted (induced?); in the other she went to term and was delivered of a normal, healthy child. She is in excellent health.

CASES IN WHICH IT IS STATED THAT THE PERFORATING INSTRUMENT WAS A CURETTE

1. Lawson Tait, Lancet, London, 1895, vol. 2, p. 326.	Perforation during curettage. "Just as I had nearly completed the operation, the curette went through the anterior wall of the uterus. I could feel its point easily through the abdominal wall." No irrigation.	A senile uterus. It was the seat of myomata.	Perforation caused no accidents. Expectancy. On removing this uterus 9 months after, Dr. Tait could see the track that his curette had made.	Recovery.
2. Jahreiss, Central für Gynäk., 1898, vol. 22, p. 137.	Perforated uterus, with curette. Great caution observed. Profuse hæmorrhage followed perforation.	Very anæmic 2-para, 14 days after abortion. Large placental debris removed.	Cervix and vagina packed lightly with gauze.	Recovery.
3. Theilhaber, Monaschr. F. Geb. und Gynäk., 1898, vol. 8, p. 419. Case 1.	Endometritis fungosa. Curette. Uterine perforation.		Expectancy.	Recovery
4. Reporter states that in both cases he had handled his curette very gently. Case 2.	Abortion. Curettage. Uterine perforation. No intrauterine irrigation.		Expectancy.	Recovery.
5. Bacon, C. S. and Herzog, Maximilian. The Am. Jour. of Obstetrics, vol. 40, 1899, p. 752.	Six months after confinement. Curettage. Perforated uterus. Overlooked accident at time of occurrence. Irrigation of uterus with 1–5000 $HgCl_2$.	At post-mortem, a perforation large enough to admit a thick lead pencil was found to be present 1.5 cm. below the left ostium tubæ.	No treatment.	Death.
6. Elder. Med. Press. & Circ. Lond., 1899, vol. 118, New series 67, p. 3. Case 1.	During a curettage, the instrument, a blunt curette, passed without any sensible obstruction or resistance until all but the handle had disappeared. No irrigation.	Post-partum uterus.	Uterus and vagina packed with iodoform gauze.	Recovery.
7. Kruser, Buffalo, American Medicine, 1901, vol. 2, p. 947.	Uterus perforated with a sharp curette.	Omentum extended out through the external os. Patient had had uterine hæmorrhage constantly for four weeks. Uterus was enlarged and subinvoluted. It contained clots and portions of membrane supposed to be remnants of an incomplete abortion.	Omentum returned to the abdominal cavity, and it was followed by a strip of gauze. Two hours later a celiotomy was made. Injured and bruised portions of the omentum were removed. Hole in uterus closed with four interrupted sutures. No drainage.	Recovery.
8. Brouardel, L'Avortement, Paris, 1901, p. 344.	Young woman, 4 months pregnant. Curettage to procure an abortion. Loop of intestine dragged into vagina. At the same time the head of the fœtus, which had been separated from the body, passed into the abdominal cavity.		Intestine replaced. Laparotomy. Head of fœtus removed, from abdominal cavity. Uterus sutured.	Death from general peritonitis.

9. Landau, L. Central für Gyn. 1901, vol. 20, p. 1023. Case 1.	Curettement for abortion. Roux curette. Perforation.	Internal hæmorrhage.		Death.
10. Case 2.	Curettage for gonorrheal endometritis. Perforation of uterus.	Internal hæmorrhage.		Death.
11. Pichevin, Semaine Gynécologique, Avril 7, 1902	Delivery 8 to 10 days previous. Curettage for retained secundines. Perforation. Considerable hæmorrhage.	Multipara. Lateroflexion of uterus.	Laparotomy. Curette had penetrated between the folds of the right broad ligament. The perforation did not involve the peritoneum. Uterine cavity packed with gauze.	Recovery.
12. Pinkuss, A., Centralbl. für Gynäk. Bonn, 1902, p. 733.	Curettement. Uterus perforated by curette.	Post-abortum uterus. Circumscribed peritonitis complicating pelvic abscess.	Extirpation of uterus.	Recovery.
13. Mauclaire, Annales de Gyn. 1903. 5, 59, p. 122.	Puerperal uterus perforated. Suppurative pelvic peritonitis.	Late supravaginal hysterectomy. Multiple peritoneal drains. Packing of pelvis.		Death.
14. Küstner, (Breslau), Monats f. Geburt und Gyn. Aug., 1903.	Two cases. Both were probably due to the curette.	Vaginal hysterectomy. In both cases, the omentum escaped into the uterine cavity. No serious symptoms were caused. In commenting editorially on Küstner's article, the British Med. Journal says, "Thus it is evident that omentum can enter the uterine cavity and set up a discharge, and that the cause in two known cases, both observed and recorded, is perforation by the curette."		Recovery.
15. Küstner, (Breslau), Monats für Geburt und Gynäk. Band Heft 2, 1903.	Case 1. Curettage performed. Case 2. Curettage performed.	In both of these cases prolonged and irregular bleeding occurred after the curettage and perforation. In both cases vaginal hysterectomy was eventually done. Both uteri were found adherent to the omentum and on section each was found to contain grape-like pieces of omentum, continuous in each case with the omental adhesions previously mentioned.		Recovery. Recovery.
16. Ficux et Lafonde, Revue mens. de Gyn. d'Obst. et de Pediatrie, 1902, No. 6, p. 242. Also Annales de Gyn. et d'Obst. Paris 1903, vol. 59, p. 155.	Post-partum patient. Seven days after delivery. Retained secundines. Putrefaction of placenta. Curettage. Intrauterine irrigation of formol. Blunt curette was used. Marked anteflexion. Perforation probably caused by uterine douche point.	The posterior wall was found to be perforated.	Packing of uterus with iodoform gauze.	Death four hours later.
17. Brothers, A., American Gyn. New York, 1903, vol. 2, p. 323.	Posterior wall of uterus was perforated by curette. Irrigation of uterus with sublimate solution.	Patient had had puerperal fever two weeks.	Laparotomy. About one gallon of pus in peritoneal cavity. Many independent pockets of pus among coils of gut.	Death five hours after operation.
18. Brothers, A., Am. Gyn. New York, 1903, vol. 2, p. 323.	Case 3. Curettage to overcome sterility. Anterior wall of uterus perforated.		Laparotomy. A cupful of pus between anterior surface of uterus and bladder. This pus collection was shut off from peritoneal cavity.	Recovery.
19. Brothers, A., Am. Gyn. New York, 1903, vol. 2, p. 323.	Patient curetted by midwife; then again by young doctor. Patient had skipped two periods.	Perforation of uterus.		Death from septic peritonitis.
20. Brothers, A., Am. Gyn. New York, 1903, vol. 2, p. 323.	Curettage for persistent bleeding after early abortion. Curette perforated uterus.	Perforation. Intrauterine irrigation with sublimate solution.	"I have never seen a picture of greater physical suffering in my life."	Death. Diffuse peritonitis.
21.	Curettage for retained secundines. Curette perforated uterus. No intrauterine irrigation.	Perforation of uterus.	Expectant treatment.	Recovery. Has borne several children since.

22.	Curettage for miscarriage and subsequent hæmorrhage. Perforation. Curette perforated uterus. No irrigation.		Expectant treatment.	Recovery.
23.	Curettage preliminary to a double salpingectomy and repair of lacerated perineum in a x-para. No irrigation. Currette perforated uterus.	Perforation of posterior wall. Very little pressure had been exerted.	Operation proceeded with. Suture of tear by vaginal route. Delivered the fundus uteri through an anterior vaginal incision and exposed the puncture on the posterior uterine surface so that all could see it.	Recovery.
24. Polak, J. A., Brooklyn. Med. Jour., 1903, vol. 17, p. 376.	Abortion. On introduction of the curette, it disappeared up to the handle. Irrigation.	Uterus, two month's pregnant.	Posterior incision made and vagina thoroughly cleansed.	Death.
25. Mauclaire, Ann. de Gyn., Par. 1903, vol. 59, p. 122.	Case 1. Small perforation with a curette. Patient was septicæmic at time of operation. Case 2. Uterine wall perforated by a curette. No irrigation.	Abortion 3 weeks previously.	Supravaginal hysterectomy. Vagino-abdominal drainage. Laparotomy. Perforation suture. Pelvis drained.	Death after operation. Recovery.
26. H. H. Schultz, Sutton, Neb., Med. Brief, St. Louis, 1904, vol. 32, p. 518.	Uterus perforated by a St. Cyr augur curette which had been slowly introduced into that organ. Curettage undertaken in consequence of a miscarriage of a 3 months' pregnancy. No irrigation.	Post-abortum uterus. 3 months pregnant.	Manipulation at once stopped.	Recovery.
27. Stoner, A. P., Jour. of Am. M. Ass. 1904, vol. 42, p. 1620.	Uterus perforated by curette. No intrauterine irrigation.	Confinement six weeks previously. Retained secundines.	Expectancy. Currettage continued. No packing.	Recovery.
28. Dr. Heineck. July, 1905. Case referred by Dr. Richards.	Post-abortum uterus. Dilated and curetted for removal of retained ovular tissues. Perforated uterus with curette. No irrigation.	Retroflexed uterus.	Expectancy.	Recovery.
29. Cook County Hospital. Case 354.143. Helen Ruthhouski. Dr. Weber.	Labor seven months before. In curetting fundus of uterus was perforated. No irrigation.		Immediate laparotomy. Wound in uterus sutured. Post-vaginal drain inserted.	Recovery.
30. Dienst. Centralbl. für Gynäk., 1905, p. 55.	Curette perforated uterus, and brought loop of small intestine,	Retained placental secundines.	Laparotomy. Sutured perforation.	Recovery.
31. Effie L. Lobdell, Am. Jour. of Obst. 1905, vol. 51, p. 127.	Case 2. Curette. Perforation, no irrigation.	Retroflexed. Post-abortum uterus. Pelvic abscess drained through vaginal vault.	Expectancy.	Recovery.
32. Browd, E. K., Medical Record, New York, 1905, vol. 67, p. 131.	Case 1. Curettage perforation.	Retained placenta, syphilitic patient.	Laparotomy. Closure of uterine rent.	Recovery
	Case 2. Curettage without anæsthesia (divulsion and curettage) next day dressing forceps pulled omentum and intestine from uterus.	No previous ailment. Applied for treatment for sterility.	Laparotomy. Resection of 5 in. of gut. End to end anastomosis. Murphy button. Uterine rent closed.	Death, septic peritonitis.
33. Thèse, Andre Molet. Paris, 1905, Perforations de l'utérus puerpéral post partum et post abortum. Obs. 20.	Normal delivery. Sero-purulent lochia. Curettage 9 days after delivery. Uterus perforated by curette.	Retroverted and retroflexed uterus.	Expectancy.	Death. Diffuse peritonitis.
34. Walker, Edwin. The American Journal of Obstetrics, 1906, vol. 54, p. 639.	Four months abortion. Perforation of uterus by augur curette. Augur curette brought out beyond the vulva a handful of intestines. Cited two other cases in which uterus had been perforated by augur curette.	31 inches of intestines had been torn away.	Laparotomy. Intestinal anastomosis. Murphy button.	Recovery.
35. Von Guerard, Cent. für Gynäk., vol. 25, p. 1138.	Carcinoma suspected. Curettage. Perforated uterus in 3 places.	9 normal births, 1 abortion. For last two months profuse hæmorrhage and putrid flow. Microscopically. Muscle atrophy. The muscle fibres were partly in a state of hyaline degeneration. Vessels were numerous and showed distinct thickening of intima.	Total extirpation of uterus.	Recovery.

36. Von Guerard, Centr. für Gynäk., vol. 25 p. 1138.	Previous to intended plastic operation. Curettement. Uterus perforated in two places by curette.	Endometritis, metritis. XII-para patient. Total uterine prolapse. Thick, large uterus.	Total extirpation of uterus. Resection of broad ligaments. Suture of stumps to vagina.	Recovery.
37. Dudley, A. Palmer. Transactions the American Gynecological Society, Philadelphia, 1905, vol. 30, p. 22.	Curette. Drew 8 inches of intestines out of cervix.	Post-partum uterus.	Replaced intestine into abdominal cavity through uterine tear. Expectancy.	Recovery. Woman since has had two children.
38. Dudley, E. C., Transactions of the Amer. Gyn. Soc. 1905, vol. 30, p. 32.	Curette. Perforation.	Uterine wall at point of perforation was soft and thin. Post-abortum endometritis with purulent discharge from the uterus. Considerable bloody fluid was found in Douglas's cul-de-sac.	Laparotomy. Sutured uterine perforation.	Recovery.
39. Kuntsch, Zentral. für Gynäk., 1907, p. 1590.	Perforation by curette in region of right uterine cornu. No intrauterine application.	Retroflexed uterus bound down by adhesions. Bilateral hydrosalpinx. Punctiform perforation in fundus.	Küstner transverse incision. Bilateral salpingectomy. Right ovariotomy. Ventrofixation.	Recovery.
40. Case 2.	Curettage of cervical erosion and of cervical cavity and perforation of uterus by curette.	Fungous endometritis, metritis, parametritis, cervical erosion and cervical catarrh.	Tamponade of uterus with CHI_3 gauze.	Recovery.
41. Fleischman, Zentralblatt für Gynäk., 1907, p. 1481.	Curettage. Curette perforated uterine wall.	Case of Chorion epithelioma. Entire uterus involved. Hæmatoma found between layers of right broad ligament. It was absorbed.		Recovery.
41*a*. Späth, Deutsche Medicin Wochenschrift, 1904, p. 681.	Patient had not menstruated for 2 months; then severe hæmorrhage for 3 weeks.	Blood and excrements found in pelvis. 20 cm. of intestines torn from its mesentery, necrosed. Fundus uteri perforated.	Laparotomy. Resection of about 20 cm. of intestines. Extirpation of uterus.	Recovery.
41*b*. Heymann, Revue de Gynécologie et de Chirurgie Abdominale.	Uterus perforated by Recamier & Sim's curette.	Uterus was subinvoluted; retroflexed. Chronic cervical catarrh.	Operator incised the vesico-uterine cul-de-sac so as to verify diagnosis; found perforation, sutured it.	Recovery.

CASES IN WHICH IT IS STATED THAT THE PERFORATING INSTRUMENT WAS A DILATOR

42. Gouilloud, Revue de Chirurgie, Paris, 1907, Vol. 27. No. 7, p. 138. Also Lyon. Médical, 1907, Vol. 140, p. 281.	Hegar's dilator No 12. Perforation. The dilator had not met any resistance. The bougie slipped into the uterine wall as though latter was butter.	Hæmorrhagic metritis. Abortion 4 months previously.	Incision of ant. vaginal fornix. Tilting of uterus. Perforation sutured. Wick of gauze inserted in uterus. Another wick of gauze inserted in vesico-uterine cul-de-sac.	Recovery.
43. Dr. Heineck, March. 1907. Case referred by Dr. Maguy.	Currettage, previous to laparotomy. Felt Hegar's dilator slipping into peritoneal cavity. Immediately suspended operation. No irrigation.	Relaxation of vulvar outlet. Prolapsed uteri. Subinvoluted and hypertrophied uterus.	Next day, though patient's condition was good. we laparotomized her. Saw perforation on posterior uterine wall near fundus. No blood in peritoneal cavity. Intra-abdominal shortening of round ligament by suturing a folded portion of each of them on posterior uterine wall. Expectancy.	Recovery.
44. Thèse, André Morlet, Paris, 1905. Perforations de l'utérus puerpéral post partum et post abortum.	Uterus perforated with Hegar's dilating sounds. No intrauterine irrigation. Dilatation curettage.	Post-abortum uterus. Some peritoneal reaction followed.	Expectancy	Recovery.
45. Mann, Matthew D., American Jr. Obst., N.Y., 1895 vol. 31, p. 603	Uterus torn with dilators, (branching steel). Placental forceps brought down intestines.	Post-abortum uterus. Intestines protruded into the vagina.	Laparotomy. Drew intestines back. Uterine rent closed.	Death from generalized peritonitis.
46. Mann, Matthew D., American Jr. Obst., N. Y., 1895., vol. 31, p. 603.	Dilatation of uterus. Steel dilators.	Post-abortum uterus. Pulled down intestine. Kept on pulling until he had drawn out 6 ft. of gut. Cut off intestine.	No treatment. Patient's family remained in ignorance of cause of death.	Died almost immediately.

47. Mann, Matthew D., American Jr. Obst., N. Y., 1895, vol. 31, p. 603.	Dilatation of uterus with Goodell Dilator. No irrigation.	Post-abortum uterus, anteflexed Hole in posterior wall of uterus.	Curettage. Packed uterine cavity with iodoform gauze. Expectancy.	Recovery.
48. Van Riper, C. S., Medical News, vol 69, p. 205, 1896.	Unimpregnated uterus. Introduction of Goodell dilator caused considerable hemorrhage.	Abdominal cavity contained a large amount of clotted and fluid blood. Rent in anterior wall extending from fundus to near vaginal vault. A perforation was also present due to a sound. Intestines had been morcellated by forceps and were held strangulated by the band of uterine tissue which existed between the tear and the perforation.	Laparotomy. Resection of 26 in. of small intestine. End to end anastomosis. Removal of uterus and appendages.	Recovery. Patient was seen 11 months after and was in perfect health.
49. Roberts, Hubert, The Lancet, London, 1896, vol. 2, p. 1784.	Fundus of uterus perforated by metal dilators. Every aseptic and antiseptic precaution observed. Great care in passing instrument. Intrauterine irrigation, HgCl 1—2000.	Post-abortum uterus. Was still flowing. Retained secundines.	Plugged rupture and the rest of uterine cavity tightly with strips of iodoform gauze. Removed gauze in 36 hours.	Recovery. Later became pregnant.
50. Marchand, Bulletin et Mémoires de la Société de Chirurgie, 1897, vol. 23, p. 535.	Hegar's dilating sound No. 12. During curettage, sound perforated uterus and was abandoned in patient's body. Patient was confined to bed for 3 months after curettage.	Patient was in state of invalidism for about a year, until sound was removed by operation.	Laparotomy. Removal of uterine sound. It was lying between two folds of mesentery of the small intestine. Sound was 23 cm. long. Diameter 1 cm. 25.	Complete restoration of health.
51. Cullen, T. S., Johns Hopkins Hosp. Reports, 1897, vol. 6.	Three months' pregnancy. A slippery elm tent introduced by a physician to produce an abortion, passed through the uterine wall.	Uterus much enlarged, soft and boggy. On section its walls were found to contain many small abscesses. Peritoneal cavity contained several quarts of purulent fluid. Necrosis of uterine walls.	No treatment. N. B. In looking at the photograph of this uterus one is led to think that the tent perforated the fundus uteri. From the text, however, one is barely warranted in calling this case a primary perforation of the uterus.	Death from diffuse suppurative peritonitis.
52. Prosper Merklen, et A. Jacomet. Bull. de la Société Anatomique de Paris, 1898, vol. 12, p. 181.	Dilatation of cervical canal. Three-branched dilator perforated fundus of uterus.	Patient 58 years old. Uterus small and painless cancer of uterus.	Vaginal hysterectomy.	Recovery.
53. Lenoir, Olivier, Thèse, Paris, 1898. Perforation utérines dans les opérations pratiquées par la voie vaginale. Obs. 15 (Segond.)	As a preliminary step to vaginal hysterectomy, curettage. Uterus perforated by Hegar's dilating bougies.	Uterus anteverted. Ovaries, sclerocystic. Salpingitis. Periadnexitis.	Vaginal hysterectomy.	Recovery.
54. Polak, John A., Med. News, N. Y., 1899, vol. 74, p. 555.	During dilatation of the cervical canal with Goodell dilator, the uterus was perforated near the right cornu.	Sutures from a previous operation were suppurating their way through the uterine wall.	Laparotomy. Uterus packed.	Recovery.
55. Kelly, Howard A., Operative Gynecology, New York, 1901. p. 482.	Cervix was ruptured by the dilator laterally into the broad ligament. The dilator penetrated the peritoneal cavity.	Tuberculosis of peritoneum and of appendages. A portion of omentum escaped through the opening.	Laparotomy. Prolasped omentum withdrawn, opening into broad ligament sutured.	Recovery.
56. Caruso. Zentralb. für Gyn., 1902, p. 1349.	Dilatation of cervical canal, dilator caused a lateral perforation of cervix.		Expectancy. No bad results.	Recovery.
57. McCrae, Donald, Western Surgical and Gynecological Transactions, p. 57.	A miscarriage several months before. Attempt to curette a uterus which practically had no pathology.	Dilator was forced through the side of the uterus at the level of the internal os, passing through the broad ligaments into the pelvic cavity, 28 in. of intestines pulled off by actual force.	Post mortem. Abdominal cavity full of blood. Woman had bled to death.	Death three hours after accident.
58. Kunstch. Zentralblatt für Gynäk., Bonn, 1907, p. 1590.	Perforation of uterus near insertion of R. round ligament, by Hegar's dilator. No curettage. No intrauterine application.	Retroflexed uterus, bound down by adhesions. Bilateral gonorrheal pyosalpinx. Chronic pelvic peritonitis.	Ant. Colpotomy. Suture of perforation with catgut. Suture of bladder-peritoneum upon ant. uterine wall.	Recovery.
59. Kuntsch.	Therapeutic abortion. Perforation of uterus by dilator. The perforation was in the cervix near the internal os. It went through the layers of the broad ligament.	Pulmonary tuberculosis. Bimanual examination showed that uterus was in normal position.	Tamponed uterus with gauze. Drained the false passage. Removed gauze in 2 or 3 days.	Uneventful recovery.

60. Braun-Fernwald, Zentralb. f. Gynäk., 1904, vol. 28, p. 1962.	Owing to a co-existing pyelitis, a 3 mo. pregnancy had to be interrupted. Hegar's instrument was introduced and slipped through the uterine wall.	Woman had regularly aborted in her past labors.	After twenty-four hours the sound was extracted, uterus packed with CHI_3 gauze. Vagina packed with gauze.	Recovery.
61. Halban. Zentralb. für Gynäk., 1904, vol. 28, p. 1412.	Hegar's dilator used. During manipulations necessary to extract the placenta, rent was torn in uterine walls. Placenta removed with Schultze's spoon forceps. Intestines were not injured.	Uterus 3 months pregnant. It was of soft consistency. Near the site of perforation, the veins were very dilated. In posterior wall of uterus there was an opening through which the finger could easily be inserted into peritoneal cavity.	Extirpation of uterus. Uterine wall partly replaced by enlarged thin-walled veins. Uterus had appearance of sponge.	Recovery.
62. Jeanne. La Gynécologie, Paris, 1904, vol. 9, p. 276.	Catarrhal endometritis. Gradual dilatation of cervical canal by aid of laminaria. Laminaria left in position slightly shorter than length of uterine canal.	The tent slipped into the uterine cavity, made pressure upon the posterior wall of the cervical canal and through the action of the uterine contractions perforated the posterior lip of the cervix.	Removal of laminaria.	Recovery.
63. Hessert, Am. Jour. Obst., 1905, vol. 51, p. 26.	A Goodell dilator introduced into the patulous cervix, and the blades separated. A placental forceps was introduced and pulled down intestine. Woman had had many abortions.	Uterus perforated and four feet of gut pulled down.	Laparotomy, 7 hours after accident. Four feet of bowel removed. Intestinal anastomosis. Uterine perforation sutured. Abdomen closed without drainage.	Recovery. Patient subsequently became pregnant. Normal confinement.
64. Geo. W. Jarman. Gyn. Trans., Phil., 1905, vol. 30, p. 15.	Curettage. 4 months' fœtus retained. Tear of posterior uterine wall by dilator.	Intestines and omentum came into view.	Laparotomy. Sewed up posterior uterine wall. Drained peritoneal cavity with gauze through incision of the post-vaginal vault.	Recovery.
65. F. T. Andrews, Am. Journ. of Obstetrics, vol. 51, 1905, p. 127.	Goodell dilator perforated the uerus. It passed between the folds of the broad ligament which it perforated just behind the Fallopian tube.		Laparotomy. Suture of peritoneum. Slender vaginal drain into the rent extending into the intra-ligamentary space.	Recovery.
66. Boldt, Herman J., Am. Jour. of Obs., N. Y., vol. 51, 1905, p.	Forty-eight hours previously had an abortion. Intended curettage. Operator used uterine dilators and at once the structures gave way. Profuse bleeding. On passing finger into the rent, it entered peritoneal cavity and felt the intestine.		Rushed to hospital. Patient had begininng peritontitis. Laparotomy. On opening abdomen a large quantity of fluid and clotted blood was found. Tear found on right side, going entirely through the cervix and a little above it. Packed pelvis, drained peritoneal cavity.	Death.
67. Schiller, Zentralblatt für Gynäk., 1905, p.	Perforation of fundus at seat of tumor either by laminaria or by dressing forceps while packing CHI_3 gauze.	Case of chorion epithelioma malignum. Five months previously woman had aborted.	Extirpated uterus.	Result not stated.
68. Thèse. André Morlet, Paris, 1905. Perforations de l'utérus puerpéral post partum, et post abortum. Obs. 12.	Post abortum uterus. Uterus perforated while dilating with Hegar's dilator.	Examining finger passes through the uterine wound into the peritoneal cavity.	Expectancy.	Recovery.
69. C. Le Masson, Annales de Gyn., Paris, 1906, vol. 3, 2d. series, p. 406.	Uterine dilatation. Laminaria. Aseptic precautions. Perforation of posterior wall of cervix.	The laminaria was, as it were, "swallowed" up by the uterus. The uterine contractions excited by its presence propelled and forced it through the posterior wall of the cervix.	Removed laminaria. Expectancy.	Recovery
70. Fleischman, Zentralblatt für Gynäkologie, 1907, p. 1481. Case 1.	Curettage for removal of placental debris. 3 months' abortion. Forceps pulled out a piece of omentum.		Omentum replaced. Uterus tamponed with CHI_3 gauze.	Recovery.
71. Case 2.	Intended to curette previous to removal of uterine fibroid cervical dilation. Dilator perforated posterior wall of uterus.			Recovery.
72. Case 3.	Uterus perforated by dilator (Hegar's). Perforation on posterior wall near lundus.		Anterior colpotomy. Perforation sutured.	Recovery.

CASES IN WHICH IT IS STATED THAT THE PERFORATING AGENT WAS A CATHETER OR A UTERINE IRRIGATOR

73. Patru, Revue Med. de la Suisse Romande, Mars. 4, 1896.	Catheter introduced in uterus to induce abortion. Perforation.	Vaginally, in right parametrium can be felt a tumefaction, hard and painful. Rectally the examining finger feels 6 or 7 cm. above the anus, a hard body bulging the rectal wall.	By aid of dressing forceps, operator succeeded in pulling through the rectal wall a catheter about 21 cm. long, which was curled upon itself and smeared with pus.	Recovery.
74. Queisner. Zentralb. für Gynäk., 1898, vol. 87, p. 712.	Uterus perforated by douche point. No fluid ran into the peritoneal cavity. All septic and antiseptic precautions had been observed before and during the operation.	Uterus retroflexed, enlarged and soft. It was also adherent posteriorly.	Expectant treatment. Uterus was packed.	Recovery
75. Schenck F., Munch. Med. Woch., No. 22, 1901, p. 888.	Patient was a ix-para. Last pregnancy, eight months previously. An intrauterine irrigator was passed into uterus for a long distance. No resistance was experienced. Irrigation of uterus with $HgCl_2$ solution. Two ineffectual attempts to measure the length of the uterine cavity with a uterine sound.	Uterine wall had been punctured in 3 places by the irrigating sound.	Laparotomy. The friability of the uterine tissues interfered with suturing. Shortening of round ligaments.	Recovery. Patient on third day after operation showed signs of mercurial salivation (gingivitis, right-sided musculo-spiral paralysis, etc.) from which she recovered.
76. D. S., Fairchild, Jour. Am. Med. Assn., 1904, vol. 13, p. 944.	An abortionist introduced a soft rubber catheter. This slipped from her hand and she pulled down what she thought to be the catheter but which proved to be 18 inches of small intestine.		A surgeon called in; made resection of intestines.	Patient died on the table.
77. Thèse. André Morlet, Paris. 1905, Perforations de l'utérus puerpéral post partum et post abortum, Obs. 40.	Normal delivery. Uterus perforated by intrauterine douche point. 2 litres of sublimate solution penetrated into the peritoneal cavity.	Uterus perforated above internal os.	Laparotomy. 6 hours after. Peritoneal cavity mopped. Peritoneal drain inserted.	Death 12 hours after.
78. Treub, Zentralb. für Gynäk., No. 28, 1906, vol. 30, p. 802.	Introduced a catheter into uterus and lost it. Three days later, patient applied at the clinic.	Uterus was dilated. It did not contain any catheter.	Found nothing. Incision of space of Retzius revealed catheter therein, which was extracted therefrom.	Recovery.
79. H. A. Von Guerard, Zentralb. für Gynäk., 1898, p. 708.	Perforation caused by a bougie introduced to cause miscarriage. "The bougie suddenly slipped from a depth of 8 cm. to one of 20 cm."	Post-abortum uterus.	Laparotomy. Uterine rent sewed up.	Recovery.
80. Hickman, J. W., Med. News, N. Y., 1895, vol. 66, p. 242.	Curettage as preliminary to trachelorraphy. Operation performed 3 months after last delivery. Uterus perforated by a uterine douche tube.	About one oz. of a per cent aqueous solution of creolin penetrated into the peritoneal cavity. Cervical tissue was soft and very vascular.	Patient had been prepared surgically for operation. Expectant.	Recovery.
81. Flandrin, J. Thèse, Paris, 1895 De la perforation de l'utérus par la sonde au cours de l'irrigation continuée.	Perforation caused by Pinard's rigid catheter in course of continuous intrauterine irrigation. Perforation close to right uterine tubal opening near fundus.	Puerperal sepsis.	Expectancy.	Death a few hours later. At the autopsy, the perforation of the uterus was found. From 5 to 6 litres of the irrigating fluid were present in the peritoneal cavity.

82. Case 2.	Continuous intrauterine irrigation for post-abortum sepsis. Perforation.	Post-abortum uterus.	Expectancy.	Death. At autopsy perforation seen. Abdominal cavity was to seen contain much fluid
83. Mauclaire. An. de Gyn., Paris 1903, vol. 59. p. 122.	Uterine wall perforated by an uterine irrigating sound. Irrigation entered and remained in the peritoneal cavity.	One month after delivery, general suppurative peritonitis at time of operation.	Abdominal, vaginal and iliac drainage. Supravaginal hysterectomy.	Death 18 hours after operation.
84. Effie L. Lobdell, Am. Jour. of Obst., 1905, vol. 51, p. 127.	Case. 1 Curettage puerperal case. Perforation of uterus.	Retroverted uterus. Perforation of uterus directly into the bladder, resulting in the formation of a permanent vesicouterine fistula.	Expectancy.	Recovery.

CASES IN WHICH IT IS STATED THAT THE PERFORATING INSTRUMENT WAS A SOUND OR BOUGIE

84b. Ernst Odebrecht, Zentralb. für Gyn., 1807, vol. 21, No. 40, p. 1442.	Uterus perforated by an Orthman's sound while raising the uterus preliminary to doing a ventrofixation. No sensation of resistance overcome perceived, by the hand that was introducing the instrument.	Uterus was retroflexed. Patient was V para, 3 ab. and was suffering from more or less uterine hæmorrhage. 5 cm. of sound was found in the peritoneal cavity.	Laparotomy.	Recovery.
85. Beuttner, Oscar Zentralb. für Gyn., vol. 21, 1807, p. 1271. Case 1.	Uterus perforated with uterine sound. Curettage. Intrauterine irrigation whith $HgCl_2$.	Patient had aborted three months previously. Retroflexed and inflamed uterus.	Expectancy. Iodoform wick in uterus.	Recovery.
86. Case 2.	Six weeks after abortion uterus is curetted. Uterine sound perforated uterus. $HgCl_2$ irrigation. Curettage attended with profuse hemorrhage.	Uterus anteflexed Adnexæ inflamed. Hemorrhagic metritis.	Expectancy. Cure is retarded by mercurial intoxication. (Diarrhœa, pain in gums, stomatitis, etc.)	Recovery.
88. Krecks. Monatschr. für Geb. und Gynäk., 1898, vol. 8, p. 19.	Uterine sound. Curettage for obtaining tissue for confirming diagnosis. Uterine perforation. No force had been used.	Uterus seat of carcinomatous degeneration. Patient was 64 years of age. For the last 3 years she had irregular hæmorrhages.	Expectancy. 4 days later Krecke extirpated the uterus.	Recovery. Microscopically, the condition was one resembling rodent ulcer.
89. Rosenfeld, E., Zentralb. für Gynäk., 1898, no. 11, p. 278.	Perforation of uterus with sound. No intrauterine irrigation. For many years patient had had complete rupture of perineum and prolapse of the uterus.	Perforation was found to be on the posterior surface of the uterus near the fundus. Uterus was soft and friable. Retroflexed uterus.	Vesicofixation of uterus. Anterior colporraphy. Partial amputation of the cervix. Perforation closed with one catgut suture. About a thimbleful of blood in Douglas's cul-de-sac.	Recovery.
90. Glæser, E., Zentralb. für Gynäk., 1898, vol. 22, p. 130.	Three months after delivery sound passed through the uterine wall of its own weight. Uterus was perforated in 4 different places.	Fundus was found to be very thin, and to be soft "as goose fat" (wie gänsefett).	Vaginal hysterectomy.	Recovery.
91. Kentmann, Hans., Monatschr. für Geb. u Gyn., 1898, vol. 8, p. 333.	This was a case of myometritis ademotosa. The uterine wall was perforated by a uterine sound. Uterus was retroflexed. Portions of the uterus were "as soft as butter."	Microscopic examination showed that the muscle fibres were widely separated from each other and the interspaces filled by a hyaline exudate. The muscle fibres were themselves much degenerated. The vessel walls also were thickened. Perforation in fundus a little to right of median line.	Vaginal hysterectomy.	Recovery
92. Jahreiss. Zentralb. für Gynäk. 1898, vol. 22, p. 137.	Curettage. Uterus perforated by uterine sound. Intrauterine irrigation.	Operation for hæmorrhage. Abortion several months previously. Uterus normal in size and in position, and apparently so in consistency.	Expectancy.	Recovery.
93. Schulze-Vellinghousen. Zentralb. für Gynäk. 1902, p. 723.	In this case it was intended to curette uterus to amputate cervix, to do a ventrofixation. Sound perforated fundus. Curettage performed.	Multipara. Uterus pulpy. Microscopical examination of scrapings showed glandular hyperplasia.	Total extirpation of uterus.	Recovery.

94.	Sound perforated uterus three times, and only the circumstance that it entered 15 cm. awoke the suspicions that perforation had occurred.	Woman was near the climacteric.	Extirpated uterus, as malignant disease was suspected and because man and wife did not want any more children.(!)	Recovery.
95. F. T. Andrews, Am. Jr. Obs. vol. 51, 1905, p. 127.	Attempt to induce criminal abortion by passage of uterine sound.	Perforation in fundus of uterus.	Laparotomy. Closed uterine rent.	Recovery.
96. Cushing, H. E., Ill. Med. Jr., 1905, vol. 7, p. 270.	Perforation caused by a sound. No irrigation.		Expectant treatment.	Recovery.
97. Hall, Rufus B., Am. Jr. of Obs., 1906, vol. 54, p. 640.	Attempt to induce abortion. Uterus perforated several times by uterine sound.	Was not pregnant at time attempt at abortion was made. Uterus perforated from horn to horn. Perforation was filled with a piece of omentum.	Temp. 102–103. Pulse 140–160. Laparotomy 2 gals. of pus evacuated. Omentum separated and tied off from the uterus. Abdominal drainage.	Recovery.
98. Johnson, Joseph Faber, Am. Jr. Obs., 1902, Vol. 45, p. 453.	Attempted abortion. Inserted in uterus a No. 3 flexible bougie. Perforation of uterus.	The bougie was found almost entirely folded in and covered over with omentum in the effort of nature to repair the damage and to prevent injury to the abdominal viscera.	Three days after, laparotomy. Bougie removed. Abdomen closed without drainage.	Recovery.
99. Treub, Zentralb. für Gynäk., No. 28, 1906, vol. 30, p. 302.	Midwife introduced bougie to induce labor. Lost bougie.	Three weeks later patient applied at the clinic with history of hemorrhage and subfebrile temperature.	Tumor felt in Douglas's cul-de-sac. Incision revealed a peritoneal abscess in which the bougie was imbedded.	Recovery.
100. Thorn. Zentralb. für Gynäk., 1904, vol. 28. p. 1762.	Perforation of uterus by an elastic bougie introduced to induce abortion. Peritoneal symptoms developed early.	Pregnant uterus.	Laparotomy. The bougie was found lying obliquely in Douglas's cul-de-sac. It was removed.	Recovery.
101. Talmey, B. S., New York, State Jr. of Medicine, vol. 7, p. 319, 1907	Patient had introduced a bougie into the uterus to induce abortion. The bougie slipped and she saw no more of it. Pain in the abdomen developed. Patient curetted. Upon insertion of uterine catheter to wash out uterus, catheter slipped in about 15 cm.	In fundus 1.5 cm. from right tube-uterine ostium, was found the uterine perforation.	Laparotomy. Bougie found. It was lying in front of proximal edge of right kidney, the closed end vertically directed downward toward the stomach. Perforation sutured. Douglas's cul-de-sac drained through the posterior fornix of the vagina.	Recovery.

CASES IN WHICH THE NATURE OF THE VULNERATING INSTRUMENT IS EITHER NOT STATED OR DOES NOT BELONG TO THE PREVIOUS CLASSIFICATIONS

102. Schwab. Bull. et Mem. de la Soc. D'Obst. et Gy. de Par., 1895, p. 495.	Perforation of the posterior surface of the uterus, near the fundus. Intra-uterine irrigation. Mopped uterine cavity with creosote-glycerine.	Post-abortum uterus. Retained decomposed ovum. The perforation opened into a focus of circumscribed peritonitis. Intestinal loop distended and covered by fibrino-purulent deposits.	Peritonitis treated medically.	Death from puerperal sepsis, four days after admission.
103. Mann, Matthew D., Amer. Jr. Obst., N. Y., 1895, vol., 31, p. 403. Case 1.	Curettage preliminary to cœliotomy Uterus perforated. Intestinal and mesenteric injuries. No intrauterine irrigation.	Post-abortum uterus. 6 in. of the ileum torn from the mesentery. Abdomen contained fluid and clotted blood, mixed with a small amount of fæces. Head of colon was injured and its peritoneum torn in several places.	Uterine cavity packed with gauze. Laparotomy. Resection of bowel, ileum anastomosed to the cæcum with a Murphy button. Colon repaired. Perforation in the uterine wall closed with six catgut sutures. Drainage tube inserted in abdomen.	Recovery.
104. Mackenrodt. Zeitschrift für Geburtsh. und Gynäk., 1896, Apr. 24.	After removal of pedunculated uterine fibromyoma, it was found that the pedicle was inverted uterine wall.	A hole had been made in the wall of the uterus through which finger could easily pass into the peritoneal cavity.	Total extirpation of uterus.	Recovery.
105. Courant, George. Zentralb. für Gynäk., Leipsig, 1897, p. 1411.	Perforation occurred during the sounding and curettage of a non-pregnant uterus.	About ½ oz. blood in Douglas's cul-de-sac. On posterior uterine surface was a lacerated wound with adherent edges. Uterus was dextroverted.	Laparotomy. Left sided intraligamentary myoma. Profuse uterine hemorrhage.	Recovery.
106. Donald. Lancet, Lon., 1898, vol. 1, p. 648.	Perforation in posterior uterine wall.	Finger could be passed into peritoneal cavity and into the tissues between the left broad ligament. Blood in pelvic peritoneal cavity.	Incision in posterior vaginal fornix. Vaginal hysterectomy.	Result not stated.

107. Vincent Société Nat. de Med. de Lyons, 6 Juillet, 1896.	Intrauterine maneuvers by abortionist. At time of admission of patient to hospital, patient was very anæmic from uterine hæmorrhage. Signs and symptoms of peritonitis. In attempt to remove placenta, forceps brought from 30 to 40 cm. of intestines into vagina.		Laparotomy. Anastomosis of ileum to cæcum. Suture of uterine perforation. Hysteropexy.	Death from peritonitis 18 hours after operation.
108. Lenoir, Olivier. Thèse, Par., 1898. Perforations utérines dans les opérations practiquées par la voie vaginale. Obs., 12.	Uterine hæmorrhage. Curettage. Uterine perforation. No intrauterine irrigation.	Six months previously normal labor. Uterus anteverted.	Expectancy. Wick CHI_3 gauze inserted in uterine cavity.	Recovery.
109. Noble, Chas. P. Amer. Gyn. & Obst. Jr., 1898, vol. 12, p. 96.	Uterus perforated during curettage for an incomplete abortion.	Post-abortum uterus. Small intestine escaped into the vagina but replaced itself. Rent in fundus of uterus ½ in. long. ½ pint of blood sponged out of the abdominal cavity.	Laparotomy. Uterine rent sewed up. Intestinal resection. Intestinal anastomosis with a Murphy button.	Recovery.
110. Hivet. Bull. et Mém. de la Société d' Obstet. et de Gynécol. de Par., 1898, p. 75, also Hivet, Zentralblatt für Gynäk., 1898, vol. 22, p. 1066.	Posterior wall of uterus had been perforated in attempt to induce abortion. Was brought to hospital in such a critical condition that nothing could be attempted in her behalf.	Uterine tissues were healthy. The perforation was situated upon the anterior and left lateral surfaces of the supravaginal portion of the cervix-uteri.	At autopsy a voluminous hæmatoma and a 3 months' fœtus were found between the folds of the left broad ligament. This communicated by an opening the size of a dollar with the uterine cavity. In front there was a subperitoneal collection of blood between the uterus and the bladder, behind, the extravasated blood extended up into the lumbar regions along the utero-ovarian vessels.	Death.
111. Frederick, C. C. Am. Jr. of Obs., vol. 44, 1901, p. 684. Case 1.	Intrauterine fibroid which had been expelled and lay in vagina. Operated with curved scissors, proceeded to cut the capsule near the pedicle so as to enucleate the tumor.	The apparent pedicle was partially inverted uterus. When growth was cut one could pass two fingers in the peritoneal cavity.	Laparotomy. Closure of rent.	Recovery.
112. Case 2.	Curettage for retained secundines. Perforation of fundus posteriorly and dragging down of loop of ileum by placental forceps.	Post-abortum uterus. Symptoms of acute intestinal obstruction developed. Gut was incarcerated but not strangulated in the uterine perforation.	Laparotomy. Gut was released. Rent in uterus sutured.	Recovery.
113. Case 3.	Curettage, following abortion. Perforation. Operator pulled down loop of gut and never stopped till he had stripped six feet of it from the mesentery.			Death.
114. Elder. Med. Press & Circ., Lond., 1899, vol. 118, New series, 67, p. 3.	Curettage. A piece of bowel presented in the vagina.	Post-puerperal endometritis.	Expectancy. Replaced bowel. Packed uterine and vaginal cavities.	Recovery.
115. Brindeau. Bull. de la Soc. d'Obst. de Par., vol. 4, p. 105, 1901.	Post-abortum uterus. Dilatation (cervical). Curettage. Few debris.	Autopsy showed a diffuse suppurative peritonitis. Numerous colibacilli and streptococci in peritoneal exudate. Heart blood sterile. An abscess in anterior wall of uterus. Uterus had been perforated?		Death on fourth day after operation.
116. Guthrod. Zeit. für Geb. u. Gyn., vol. 47, p. 1902.	Two months' abortion. Curettage. Bowel drawn down by forceps.		Reposition of bowel from below. Uterus tamponed with gauze. Subsequently abdominal section was performed for adhesions.	Recovery.
117. E. Foisy. Bull. et Mém. de la Soc. d' Anat., Par., 1903, vol. 5, p. 734.	Abortion; perforating agent not stated. It was impossible to tell in this case whether the injury was caused by the measures taken to procure the abortion or by gangrene of the uterus.	Post-abortum uterus. 3 months pregnant. Suppurative peritonitis. Perforation in fundus near left tube. The layers of the left broad ligament were distended by an extravasation of blood.	Sub-total hysterectomy and ablation of adnexæ. Abdominal and vaginal drain.	Death.
118. Ullman. Rev. de Gynéc. et de Chir. Abd., Paris, 1903, vol. 7, p. 1083.	Curettage. Double perforation of uterus.	Patient had skipped two periods. Intestine appeared in the vagina.	Laparotomy, four hours after accident. Perforations in uterine wall sutured. Injured portion of intestine 2 metres and 20 cm. long resected. Circular enteroorraphy.	Death from general peritonitis.

119. Van der Warker. New York Med. Jr., 1903, vol. 78, p. 691. Case 1.	Perforation of uterus in a case of early abortion for which a rapid dilation and curettage were made.	Post-abortum uterus. Omentum brought out of uterine cavity. Loop of gut in uterine rent.	Laparotomy and intestinal anastomosis. Murphy button. Suture of mesentery. Rent in uterus sutured.	Death next day.
120. Case 2.	Uterus perforated during a curettage. Curettage performed by very incompetent hands.		Laparotomy. Attempted suture of uterine rent but sutures would not hold. Inserted a piece of gauze through the uterine rent and the uterine cavity into the vagina.	Death in a little over 48 hours, in profound sepsis.
121. Perl. Zentralb. für Gyn., No. 50, p. 1568, vol. 28, 1904.	A midwife had produced a rent 20 cm. long in attempt to induce abortion in a woman pregnant four months. Abortion three days later.	The needle or trocar that had been used was removed from an abscess in the right inguinal region where it became encysted after passage through the uterine wall.		Recovery.
122. Dienst. Monats für Geb. und Gynäk., 1904, vol. 20, p. 000.	Curettement. The curettement followed removal of a tumor from the uterine cavity, 30 days after labor.	Perforation of uterus. Loop of small intestine pulled down.	Abdominal section. Repair of uterine rent. Intestine not much injured. Gauze drainage of uterus.	Recovery.
123. Holmes, Rudolph W. Am. Jr. of Obs., 1905, vol. 51, p. 127	Criminal abortion a week previously. Curettage. Wound in posterior wall just above internal os.	Intestine pulled in vagina. Intestine prolapsed between the woman's legs. Had been replaced in vagina by physician and retained there by a small tampon.	Laparotomy. Resection of bowel, end to end anastomosis with Harrington segmental ring. Supravaginal hysterectomy.	Recovery.
124. Jarman, George W. Gynec. Trans., Phil., 1905, vol. 30, p. 15. 88	Curettage.	Incomplete abortion 3 months. A loop of intestine pulled into the vagina.	Laparotomy. Repair of intestine. Rent of uterus sewed up with deep and superficial sutures.	Recovery.
125. Jarman. Geo. W Gyn. Trans., Phil., 1905, vol. 30, p. 15.	(Case 3). Curettage for chronic endometritis. Perforation.		Laparotomy.	
126. Case 4.	Curettage as preliminary to abdominal operation. No irrigation.	Perforation in the fundus of uterus near its posterior aspect.	Expectancy.	Recovery.
127. Thèse, André Morlet, Paris, 1905. Perforations de l'utérus puerpéral post partum et post abortum. Obs. 4.	Post-abortum uterus. 3 months abortum.		Expectancy.	Recovery.
128. Thèse. André, Morlet, Paris, 1905. Perforations de l'utérus puerpéral post partum et post abortum, Obs. 22.	Currettage. Uterus perforated in two places, intrauterine irrigation of $HgCl_2$, then boric acid.	Perforations were detected on the autopsy table.	Expectancy.	Death 12 hours after curettage.
129. Browd, E. K. Med. Record, New York, 1905, vol. 67, p. 131. Case 1.	Curettage; perforation.	Retained placenta syphilitic patient.	Laparotomy. Closure of uterine rent.	Recovery.
130. Case 2.	Curettage without anæsthesia. Divulsion and curettage. Next day dressing forceps pulled omentum and intestine down from uterus.	No previous ailment. Applied for treatment for sterility.	Laparotomy. Resection of 5 in. of gut. End to end anastomosis. Murphy button. Uterine rent closed.	Death. Septic peritonitis.
131. Thèse. André Morlet, Paris, 1905. Perforations de l'utérus puerpéral post partum et post abortum. Obs. 7.	Dilatation; curettage; omentum brought out by swab into vagina.		Laparotomy. Resection of prolapsed portion of omentum. Suture of uterine perforation. 4 interrupted sutures.	Recovery. One year after, normal parturition. Intrauterine exploration could detect no site of previous perforation.

132. Topfer. Zentralb. für Gyn., 1905 ,p. 928.	Several perforations near right tube. Curetted uterus.	Post-abortum uterus.	Laparotomy. Perforations sutured.	Recovery.
133. C. E. Congdon, Am. Jr. Obs., 1906, vol. 54. p. 618.	Curettage. Operator pulled 40.5 cm. of small intestine into the vagina, made traction and twisted it off.	Two lacerations of uterus. Abdominal and pelvic cavities contained quantities of blood. One laceration extended through the fundus from tube to tube; the second through the uterus and broad ligament on left side.	Laparotomy. Uterine wound sutured with catgut. Resection of intestine. Intestinal anastomosis with a Murphy button. Button passed on 35th day.	Recovery.
134. Geitpel. Zentralb. für Gynäk., 1906, vol. 30, p. 958.	Showed two uteri which had been totally sectioned. They had been perforated through artificial abortion.	No evidence of septicæmia in either specimen.		
135. Francis A. Harris and Wm. F. Whitney. Boston Med. and Sur. Jr., vol. 155, 1906, p. 739.	Criminal abortion about 4th month of pregnancy. Anterior wall of uterus showed a transverse rent completely through it, about 1½ in. in length.	The fœtus had escaped into the peritoneal cavity, and a coil of intestine stripped from its mesentery was found projecting into the vagina.		Death from general peritonitis.
136. Do.	Woman two months pregnant used instruments. Intestine was pulled out and cut 3 ft. Hanging from vagina was a piece of gangrenous gut, about 6 to 8 inches long.		Laparotomy. In top of uterus was a ragged rent one in. long in which gut was constricted, and closed to the uterus it was black and gangrenous. Enterorrhaphy. Rent in uterus closed. Drainage.	Death. General peritonitis.
137. Picqué. Rev. de Gynéc. et de Chir. Abdom., 1906, vol. 10, p. 693.	Post abortum curettage. Perforation of posterior surface of uterus.	Tissue gangrenous around the perforation.	Supravaginal hysterectomy. Abdominal and vaginal drainage.	Died 15 days after the operation. Diffuse suppurative peritonitis.
Reporter was in	doubt as to whether perforation in this	case was traumatic or spontaneous, that	is, secondary due to localized ga	ngrene.
138. Grimstead. St. Louis Clinique, vol. 20, 1907, p. 30.	Curettage preliminary to a laparotomy. No irrigation. Uterus was packed.	Accident not discovered until the abdominal cavity had been opened. The gauze packing was seen to have entered the peritoneal cavity.	Perforation closed with catgut.	Recovery. Subsequent pregnancy normal.
130. Alex. Werelius. Jour. Am. Med. Ass., vol. 48, 1907, p. 945.	Six hours previously had undergone an operation for criminal abortion. Large mass of intestines protruded into the vagina. It was minus its mesentery.	Peritoneal cavity partly filled with blood. Uterus found to contain 7 punctures. Rent in left broad ligament. Uterus still contained fœtal head and part of placenta.	Laparotomy. Gangrenous bowel 12 ft. long was resected. End to end intestinal anastomosis with Murphy button. Uterine contents removed.	Recovery. 8 months after operation patient had gained 31 lbs. Showed no symptoms of adhesions or local tenderness
140. A. Lapthorn Smith. Am. Jour. Surg. and Gyn., vol. 17, p. 158. 6 cases.	The accident is especially liable to occur after miscarriage and confinements, owing to the uterus going through the process of involution or fatty degeneration of its muscles.		All possible aseptic and antiseptic precautions were taken in every case before operation. The expectant treatment followed in all cases. Laparotomy, however, advised in case of sepsis or where irrigating fluids have been used.	Recoveries.
141. Taylor. Howard C. Amer. Jr. of Obst., vol. 55, May, 1907, p. 669.	Abortion. Last menstruation six weeks previous.	At autopsy there was found a marked local peritonitis and the fundus of the uterus a circumscribed area of gangrene about 2 in. in diameter, with a probable perforation.	Expectant treatment. The author thought that this condition must have been produced by some such means as the introduction of carbolic acid or other material. "It does not seem that merely passing the uterine sound would have produced the condition that we found in the uterus."	Death.
142. Ludwig. Zentralb. für Gynäk., 1907, p. 1482. Case 1.	Retained placental tissues. Perforation of uterus leading into vesico-uterine space.	Post-abortum uterus.	Expectancy. Uterus tamponed.	Recovery.

143. Case 2.	Curettage. Dressing forceps perforated uterus.	Post-abortum uterus.	Expectancy. Uterus tamponed.	Recovery.
144. Cook County Hospital, Case 35527 I, Rosie Horn. Dr. McBirney.	Dilatation. Curettage about 4 months after normal delivery. Normal labor. No malposition. No irrigation.	Endometritis. Rupture of fundus from middle to almost the beginning of right corner. No blood clot in peritoneal cavity.	Immediate laparotomy; after, freshening of edges. Wound in uterus was closed with silk sutures. For a couple of days patient complained of abdominal pains.	Recovery.
145. Kuntsch. Zentralblatt für Gynäk., 1907, p. 1590.	Criminal abortion. 3 months gestation. Wound establishing communication betewen cervical and vaginal canals. The hæmorrhage was greater through the perforating wound than through ex. os.	Anteflexed uterus.	Insertion of laminaria tent. Iodoform gauze tamponade. Digital removal of ovum.	Recovery.
146. Kuntsch.	In cervical cavity on left side was a perforation leading into the left parametrium. Criminal abortion 3 months of gestation.	Post-abortum uterus. Uterus enlarged, soft, much hemorrhage. Retained secundines.	Sepsis. Metrolymphophlebitis. The uterus was permeated with microscopic streptococcic abcesslet.	Death. At autopsy it was seen that the fistulous tract created by the perforation extended into the region of the kidney. The broad ligament and pelvic peritoneum were not injured.
147. D.S. Fairchild. Jour. Am. Med. Assn., 1904, vol. 42, p. 944.	Patient attempted self-abortion by introduction of a straightened hairpin.		Laparotomy. Pin found high up, the upper end near the diaphragm.	Recovery.
148. Thorn. Zentralb. für Gynäk., 1904, vol. 28, p. 1076.	Abortionist had used electricity. Had passed a rod into the uterus to end an undesired pregnancy.	Circumscribed suppurative peritonitis. Pockets of pus.	Laparotomy. Fully ½ pint of pus was evacuated. Through drainage.	Died of sepsis on 8th day.
149. H.E. Cushing. Ills. Med. Jour., vol. 7, 1905, p. 270.	Perforation caused by knitting needle introduced to produce abortion. Patient was not pregnant.		Expectant treatment.	Recovery.
150. F.T. Andrews. Am. Jr. of Obs., vol. 51, 1905, p. 127. Case 1.	Attempt to induce abortion by introducing meatskewer into the uterus. The physician in attempting to deliver the abortion, had pulled down a considerable quantity of bowel into the vagina and had lacerated the bowel a considerable extent.		No treatment. She died within an hour. Nothing could be done for her.	Death.
151. M. Bullard. West Surg. & Gyn. Tran., 1903, p. 60. Case 1.	Probe passed through uterine wall with but little force being exerted. Point of probe had been wrapped in cotton and dipped in carbolic acid.	Uterus very septic; foul vaginal discharge.		Death in 24 hours.
152. Case 2.	A bone crochet hook introduced to produce abortion, slipped from woman's fingers into the abdominal cavity.		Uterus dilated but no foreign body found. Six months later the patient became pregnant. The crochet hook was finally discharged through the anterior abdominal wall. Patient suffered but little pain, was not sick, went about as usual. Delivery of child natural.	Recovery.
153. Hönck, E., Hamburg. Münch. Med. Wochenschr, 1904, p. 801.	Abortion. Curettage on account of severe hæmorrhages. Uterus perforated.		Expectancy. Confinement to bed for seven weeks on account of peritoneal complications.	Recovery. At a subsequent pregnancy, opening in uterus enlarged. It could admit three fingers.

BIBLIOGRAPHY

1 *a*. Bovis. Les pseudo-perforations. La Semaine Médicale Paris, 1906, vol. xxvi, p. 253.

b. Kossman, R. Algemeine Gynäk., Berlin, 1903, pp. 315, 429. Also Munch. Med. Wochens., 1900, March 6.

c. Von Tussenbrock, Catherine. Zentralblatt für Gynäk., 1905, p. 1054.

d. Asch, Robt. Die Erschlaffung des nicht schwangeren uterus. Zentral. für Gynäk., 1905, p. 1250.

2 *a*. Cullen, Thos. S. Jour. of Am. M. A., Chic., vol. xlviii, p. 1491.

b. Garrigues, H. J. Medical Record, New York, vol. xii, p. 413.

3. Blondel. Un cas d'utérus bi-partitus ayant donné l'illusion d'une perforation au cours d'un curettage. Annales de Gynécologie, 1898, vol. 50, p. 157.

4 *a*. F. C. Flöckinger. Ein positiver Fall von Sondierung des Fallopian Tuben. Zentralblatt für Gynäk., Leipzig, Aug. 27, 1898.

b. Watkins. Am. Jour. of Obst., vol. li, 1905, p. 177.

c. Hind, C. W. On passage of the Uterine Sound into a Fallopian Tube. British Med. Journal, London, 1898, ii, p. 1489.

d. Thorn. Tuben Sondierung und Uterusperforation. Zentralblatt für Gynäk., 1904, vol. xxviii, p. 1072.

e. Ahlfeld, F. Zentralblatt für Gynäk (Bonn), 1902, p. 1072.

5. N. Gheorghiu. Thèse de Paris, 1900, p. 43.

6. Craig, Dan H. New York Med. Journal, March 19, 1904.

7. Rebreyend. Les perforations chirurgicales de l'utérus en dehors de l'hystéromètre et du curettage. Revue de Gynécologie, Paris, 1901, vol. v, p. 203.

8. Guelliot. Coup de couteau ayant pénétré à travers l'échancrure sciatique jusqu' à l'utérus gravide et jusqu'au fœtus. Bulletins et Mém. de la Soc. de Chirurgie de Paris, 1886, n. s., xii, p. 337.

9. Pichevin. Progrès Médical, troisième série, 1905, vol. xxi, p. 946.

10. Van Riper, C. S. Med. News, 1896, vol. lxix, p. 205.

11. Auvard. Archives de Tocologie et de Gynécologie, Paris, 1894, vol. xxi, p. 581.

12. Dupuy. De la perforation des parois utérines per l'hystéromètre. Progrès Médical Paris, pp. 109, 134, 171, 195.

13 *a*. Liebman, Carlo. Archives de Tocol., Paris, 1878, vol. v, pp. 740, 1879, vol. vi, pp. 40, 554, 631, 686.

b. Lawson Tait. Lancet, London, vol. i. p. 594.

c. Lenoir, Oliver. Les perforations utérines dans les opérations pratiquées par la voie vaginale. Thèse Paris, 1898.

14 *a*. Jeanne. La Gynécologie, Paris, vol. ix, 1904, p. 276.

b. Le Masson. Annales de Gynécologie, Paris, 1906, 63, deuxième série.

15. Byron Robinson. N. Y. Med. Journal, 1906, vol. lxxxiii, p. 127.

16. Coe, Henry C. Medical Review of Reviews, April 27, 1907.

17. Demelin. Bull. de la Soc. d'Obst. de Paris, April 19, 1906.

18. Cullen, Thos. Journal of Am. Med. Assn., vol. xlviii, p. 1491.

19. Tarnier et Chantreuil. Traité d'accouchement, Paris, p. 492.

20. Jeannin. l'Obstétrique, Paris, Mai, 1906.

21. Bacon and Herzog. Necrosis and Eccentric Atrophy of the Uterus. American Journal of Obstetrics, vol. xl, 1899, p. 752.

22. Zincke. Am. Jour. Obstet., 1894, vol. xxix, p. 578.

23. Picquet et Clays. Perforation de l'utérus par un cancer du col. Bull. et Mém. de la société Anatomique de Paris, 1905, vol. vii, p. 911.

24 *a*. Bird, Frederic. Lancet, London. 1542–43, p. 645.

b. Salva Mercade. Les Abcés de l'utérus. Annales de Gynécologie et d'obstétrique, Paris, 1907, vol. iv, deuxième série, p. 29.

c. Von Franqué. Zentralb., für Gynäk., Leipzig, 1902, No. 20, p. 544.

d. Kuss, George. Les Abcès de l'utérus, La Gynécologie, Paris, 1906, p. 505.

25. Porak. Bull. et Mém. de la Société Obstétrique et de Gynécologie de Paris, 1895, vol. v, p. 503.

26. Lea, Arnold. Journal of Obstetrics and Gynæcology of the British Empire, 1905, vol. v, p. 159.

27. de Chegoin, Harvez. Gazette Hebdomadaire de medicine et de Chirurgie, Paris, 1868, vol. v, p. 811.

28. Gottschalk. (Berlin Med. Society) Am. Jour. Obst., vol. xli, 1900, p. 127.

29. Schmidlechner, K. L'Obstétrique, Paris, 1906. No. iv, p. 632. Also analysis in La Gynécologie, Paris, 1906, No. iii, p. 249.

30. Richardiere, H. Les perforations utérines avec gangrène localisée. Annales d'hygiène publique, Paris, 1887, vol. xvii-xviii, p. 427.

31. Winter. Zentralb. für Gynäk. Berlin., 1886.

32. Maygrier. Bull. et Mém. de la Soc. d'obstétrique, Paris, vol. iv, 1901, p. 363.

33. Halban. Ueber Phlebectasien des graviden Uterus und ihre klinische Bedeutung, Monatschr. f. Geburtsh. u Gyn., xx, p. 313.

THE DIAGNOSIS OF DUODENAL ULCER

A Discussion Given Before the Chicago Medical Society, May 14, 1908

By B. G. A. MOYNIHAN, M.S., F.R.C.S., Leeds, England

THE diagnosis of duodenal ulcer rests not so much upon the alterations in the size or action of the stomach, nor upon the chemical changes in the stomach contents, but rather upon the anamnesis. The history of cases of duodenal ulcer is generally as follows:

After food is taken the patient is free from pain, the period of an hour or two which follows a meal is the best time in the day. At a time varying from one and a half to four hours after the meal a sense of uneasiness is noted in the upper part of the abdomen. A burning, gnawing sensation develops, and there is a bitter taste in the mouth, with, it may be, eructations of food or gas, bitter and acid in taste. The pain, which gradually increases, may be relieved, often considerably, by belching or by pressure. As it increases in severity it strikes through to the back, to the right of the middle line, and it may radiate round to the right side of the chest. As all patients discover for themselves, the taking of food relieves the pain, so that many carry a biscuit in their pockets, or take milk, a dose of an alkaline medicine, or some form of food, as soon as the uneasiness develops. In several cases upon which I have operated the pain has been more severe than this—has been, in fact, indistinguishable from a mild form of hepatic colic; the patient describes the pain, which comes constantly two or three hours after food, as a "colic" or a "spasm." It is possible that a spasm of the pylorus is actually present, for such a condition may subsequently be seen during the course of an operation. The pain, it will be noticed, comes on at a time when the patient should be beginning to feel hungry for his next meal; for this reason the term "hunger-pain" which I suggested in a former paper, seems quite appropriate. The interval of relief after a meal varies chiefly according to the character of the food taken. The more substantial the food, the greater the interval of relief. The appetite is generally good; in fact, often better than the normal, if stenosis has not developed. It is not unusual for a patient to say, "I've a good appetite; I can take anything, and I never vomit." If he has given a history of pain, as I have described it, one may be confident that he has duodenal ulcer, without stenosis. Investigation by test meals will show no stasis and perhaps, but by no means always, some hyperacidity.

After a time—a few weeks, a month or two—the symptoms may gradually improve, and even disappear, to reassert themselves after a longer or shorter interval. The patient will then speak of having "attacks" of a certain duration, coming capriciously, leaving spontaneously. In the intervals of these attacks he may be perfectly well, suffer absolutely no discomfort, enjoy food, and gain weight. The attacks are more frequent and more severe in cold weather than in warm. A "chill" is often assigned as a cause of a certain attack, and attacks seem especially apt to come in times of stress and worry. The recognition of duodenal ulcer is most necessary, for it is, I feel sure, a far more serious disease than gastric ulcer, and it is, moreover, one which, in my judgment, should always be treated by operation. I often see and operate upon cases of duodenal ulcer which have been variously diagnosed as "chronic gastritis," "acid dyspepsia," "hyperchlorhydria," etc. But a slender acquaintance with the pathology of the living is all that is needed to connect the clinical history outlined above with a condition of chronic ulceration in the duodenum.

The following conclusions as to the surgical treatment of benign diseases of the stomach were reached:

1. The operative treatment of stomach disorders should be confined exclusively to those cases in which an organic lesion is present. Unless there is a palpable and demonstrable ulcer in the stomach or in the duoden-

um or some condition which hampers the proper action of the stomach, the symptoms are not due to any pathological cause capable of being relieved by surgical interference. However careful our preliminary investigations may be, we shall from time to time display upon the operation table a perfectly normal stomach. We must not then endeavor to cover our diagnostic disaster by the performance of an unnecessary operation upon the stomach but rather must we candidly confess that our exploration has proved negative. To perform gastroenterostomy in such cases has, I think, been proved to lead to unsatisfactory results, whereby the operation is discredited.

2. In cases of acute perforating ulcer, the perforation should be closed or the ulcer excised. When the ulcer lies upon the lesser curvature nothing more is necessary than this. The after history of such cases shows that they are relieved from all disabilities referable to the stomach. When the ulcer is prepyloric, pyloric, or duodenal, gastroenterostomy also should be performed. It doubtless hastens the immediate recovery of the patient by affording an easier exit from the stomach.

3. When a non-malignant lesion is discovered, the treatment appropriate to it depends upon its position in the stomach. If an ulcer be placed on the lesser curvature at some distance from the pylorus, in such a position that no obstruction is offered to the onward passage of the food, excision should be performed. In such cases the relief from gastroenterostomy may be incomplete, and it is probable that the later onset of malignant disease occurs in a large proportion of cases. In some cases, however, when the ulcer is on the curvature or on the posterior surface of the stomach adherent to the pancreas, relief follows if gastroenterostomy is performed on the cardiac side of the lesion. It may be that the ulcer when anchored impedes the proper movements of the stomach, or that the nerve supply being interfered with, some local paresis of the gastric wall results.

4. If the ulcer be prepyloric, pyloric, or duodenal gastroenterostomy should be performed. It is desirable also to infold an ulcer whenever possible, for both hæmorrhage and perforation have occurred from ulcers for which gastroenterostomy has been performed months or years before. The local treatment of the ulcer is always desirable and is generally easily performed.

5. The most satisfactory method of gastroenterostomy is the posterior no-loop operation with the almost vertical application of the bowel to the stomach. The vertical position is that into which the jejunum falls most easily in the normal (that is, the erect) position of the body. A deviation to one or other side if slight is of no importance.

6. Regurgitant vomiting occurs as a result of the "loop" operation, whether anterior or posterior. It is relieved almost certainly by an enteroanastomosis. Patients who suffer from it may be relieved entirely of all symptoms for which they originally sought relief. An operation that is mechanically imperfect relieves the original disorder, though it leaves serious disabilities behind it. The vomiting of bile may be relieved by lavage and in some patients disappears entirely after the lapse of weeks or months or even years.

7. In cases of hour-glass stomach the surgical treatment necessary presents special difficulties on account of the frequency of a dual lesion: one on the body of the stomach, one at the pylorus, and double operations have consequently to be frequently performed.

8. The whole of my experience in the surgery of these benign disorders may thus very briefly be epitomized:

In cases where genuine organic disease of the stomach or duodenum has been present, and that treatment which my present experience would indicate as appropriate has been adopted, surgical measures have been attended with a small mortality, and the relief afforded has been complete and permanent.

In cases where the evidence of structural disease was insignificant, or absent, the result has been indifferent or positively bad.

The scope of such operations as Rodman's, the excision of the ulcer-bearing area, and of the excision of ulcers on the lesser curvature and towards the cardia, should unquestionably be broadened. I have been in error in several cases in resorting to gastroenterostomy instead of to the more radical and perhaps equally safe procedures.

FURTHER STUDIES OF BROAD LIGAMENT PLICATION FOR UTERINE RETROVERSION

By C. N. SUTTNER, Walla Walla, Washington

THERE are many methods employed for the correction of uterine retroversion. It is largely a matter of choice with us according to the method first employed which gives us fair results, and hence it is not altogether easy to change to any new devise that is offered as the *sine qua non*. What may be the most efficient means of correction in the hands of one operator may in the experience of another give less brilliant results. And thus it is in the various methods utilized at correcting retroflexio uteri.

All operators who devised any method endeavored to so correct the deformity of this organ as to place it in its normal position and permit it to functionate normally.

Any improvement upon any certain technique held this in view. And thus we have upward of seventy different methods, each varying from the other. This difference of opinion is basically: What constitute the true supports of the uterus? Here is a diversity of opinion as to what are the supports of the uterus. Is it the pelvic floor, and are the transverse fibers in the levator ani muscle the factors claimed? Is the anterior vaginal wall all important, or is the uterosacral ligament at fault?

Dr. R. C. Coffey, with an originality characteristic of him, began numerous experimental operations on the lower animals in order to test the functions of the peritoneum. He has thus proved the wonderful strength and adaptability of this structure in establishing artificial supports where nature had become derelict. Thus he formulated a law that the morphological relation of the peritoneum to the various abdominal viscera (and according to its embryonic development) is the suspensive power of them and hence the uterus as well.

Whether or not this law is fundamental and universally applicable in uterine retroversion has to be proven clinically. Employing the Coffey method in sixty-four out of seventy-nine operations for grave displacements of this organ, I have obtained results as hereafter detailed.

In the selection of such operative cases extreme caution has been taken, particularly as to advising any certain method of procedure. I found it best to assure my patients that such a method would be employed as seemed best for their particular case.

The cause of uterine retroversion, whenever determinable, has been one of the guides as to the selection of any certain method. Likewise the age of the patient as well as occupation. Women beyond the menopause were subjected to Kelly's most excellent methods, the suspension and fixation operation; while those of child-bearing ages were operated on either by the Gilliam-Peterson, Webster, and sixty-four by the plication method.

I have had three cases of suspension repositions in child-bearing women which became fixations, from what cause I do not know in two. In one case fixation was caused at the point where the tenaculum grasped the uterus, proven by a secondary operation. The two cases that became fixations, although suspensions were done, have given me great trouble in their respective confinements.

These troubles were (1) pain in the back; (2) the cervix retraced so high in the pelvis posteriorly that I could not reach it digitally, but had to draw it down by tenaculum and use a Bossi dilator. One woman (Mrs. J. W. A.), pregnancy lasted 309 days, beyond the question of doubt. When labor developed uterine contractions were weak and futile, necessitating forcible dilatation (Bossi) and instrumental delivery, which was promptly followed by post-partum hæmorrhage and continuous reforming of intrauterine blood-clots during a slow and tedious period of subinvolution.

The child is a confirmed epileptic; while physically strong and over-developed, he is mentally a dwarf. He is now two years old

and has been under treatment by some of our best internists. (3) Contrary to authorities the anterior and not the posterior part of the uterus became so thin that I thought of the possibility of a ruptured uterus before the cervix could be brought down and dilated mechanically (Mrs. J. W. A.). (4) One woman (of these two) suffered from nausea and vomiting for the whole nine months. She had an uneventful labor, yet severe and long continued after-pains, with the formation and expulsion of large blood-clots. Having had the above in quick succession, one naturally will select any method devoid of such complications. The Peterson transrecti round ligament advancement seems to be ideal. Yet here we use a muscle — a continuation of the uterine non-striated musculature. As such any continuous tension is impossible and hence not suited in all cases of retrodisplacements. If the pelvic floor is sufficiently firm, i. e., the transverse fibers of the levator ani muscle generally normal, and a transrecti aponeurosis advancement made, the adhesions or blending of the peritoneal coverings of the round ligaments with those of abdominal parietes will be sufficiently strong to maintain the uterus in a naturally and normally anteflexed condition.

Any abdominal organ suspended by and from its peritoneal moorings normally does not require any great amount of strength to maintain its position, provided all organs are well balanced.

In cases of general ptosis of the viscera the correction of any one viscus may relieve this pathological (?) condition without relief of course to others. This general ptosis of viscera — there being a general relaxation — associated with uterine ptosis gives slight satisfaction by correcting the uterine difficulty regardless of method employed. Under such condition the broad ligament plication has been a failure at correction in two cases. The uterus would remain too low in the pelvis regardless of the tenseness of the plication. Although the organ would maintain the slightly anteflexed position, yet, owing to this profound tissue relaxation, the cervix would drag low in the vagina and backache as well as nervous symptoms continued.

In a paper (Uterine Retroversion and its Treatment) which I read before the Washington State Medical Association, September 11–13, 1906, I stated that from an embryologic standpoint, the suspensive power of the peritoneum originates diaphragmatically, etc. If this be true, any attempt at correcting a displaced uterus (whatever the displacement may be) by peritoneal reduplication without having a strong pelvic floor (levator ani) will be useless as planting a pole without foundation, thinking that the guy ropes will maintain its normal position. Little tension will be required of the guy ropes if the foundation is solid and the pole well balanced. And thus it seems to me in my operations upon retroverted uteri. The plication operation, if I may so style it, is well adapted in all cases save those in which there is:

1. A relaxed pelvic floor.
2. In cases of general visceral ptosis.
3. In very heavy uteri.

It is superior to any that I have tried.

1. It prevents in the child-bearing woman any gestation and parturition complications.
2. It assists (more than any other) the normal functionating of this organ.
3. The broad ligament plication cures the continuous backache associated with retroversion as well as other pelvic disorders, due, I think, to the non-attachment or fixation of an organ intended to act unrestrainedly.

In all cases but eleven in which the broad ligament plication was done, non-operative treatment had been tried varying in time from three to six months, such non-operative treatment consisting in the use of lamb's wool tampons, pessaries (Hodge and others) etc. While some were benefited it was only temporarily, inasmuch as other pelvic patholgical conditions frustrated any permanent help. To some the simple presence of a pessary (though well fitted) became irksome and could not be borne.

Uterine displacements are very frequently associated with and caused by pathological condition of the uterine adnexa. In thirty-one cases out of sixty-four in which the Coffey method was used, there were nine complicated by pyohydrosalpynx, two of uterine fibroid, seven of cystic ovary (unilateral), five chronic appendicitis, one dermoid cyst, one

sarcoma of right ovary (Mrs. D., Eugene, Oregon) six of general adhesions due to previous pelvic peritonitis.

While the plication method has many advantages over other well-known methods which require the opening of the abdominal cavity it is very superior to many in the ability to correct complications.

There is little risk at opening the abdomen in this day of asepsis and perfected technique, particularly when for a plication operation *per se*. Should, however, other pathological conditions exist, these can be remedied at one operation. I had no fatality in the plication method until the last case, which I shall give in detail later on.

Although we almost to a certainty can promise exactly what is necessary to do in an operation, yet cases arise requiring more work, which, if the patient dies, leaves one in a painful position, especially when ignorant furies rule.

In the cases of broad ligament plication there were four non-successful. In two cases the general ptosis of all viscera permitted the uterus to again drag low in the pelvic cavity, giving no relief of backache and the usual train of symptoms. In the third failure there was complete retroversion associated by what, for want of a better term, we call "neurasthenia." She had no relief from the operation; the uterus had sagged low in the pelvis, perhaps due to its excessive weight. Four months after the first operation, a secondary operation was performed to do a Kelly suspension. This had been accomplished, however, but too near the bladder. The trauma done by a tenaculum to the fundus had resulted in as beautiful a Kelly as could be imagined.

However, after a Kelly suspension, no relief. At the end of six months she drifted into the hands of my colleagues at Spokane, who first performed a double ovariotomy and some five months later a pan-hysterectomy. According to a recent letter from the husband she was no better. Her trouble is, no doubt, entirely mental and no relief could perhaps be given (unless psychical) by any method.

In the fourth failure (plication) I do not blame the method but detail the case inasmuch as it has been of particular interest and post-mortem data were obtained. This lady was the mother of two children, one two and a half years old, and one four months. I attended her in her first confinement, after which I had to repair cervix and perineum. During my absence at Seattle the first week of January this year, she was attended by N. N. in her confinement, when again, owing to enormous development of the child (fourteen pounds) he repaired cervix and perineum, but for some reason his repair proved ineffectual. Dr. N. N. told me that he thought it was due to Bright's disease, from which she was suffering. The cervix prior to first confinement was very long, about two and one-half inches. The first repair was successful. Now she had an anterior and posterior laceration. The anterior laceration extended one inch into the body of the uterus. The bladder had descended and attached itself into this crevasse, forming a cystocele into the apex of which lay buried these two cartilaginous digits of the cervix formed by the laceration. The body of the uterus was retroverted like a bent gourd resting against the rectum above the sphincter, likewise no control over the bladder. During the first and second pregnancies, she suffered from albuminuria.

Having frequently refused to operate and suggested to them a number of my colleagues to do the work, I finally, through sympathy for the old mother, who stated that "Kate (her danghter) had most confidence in me," consented to operate.

She entered St. Mary's Hospital April 28, and was operated on at 8 A. M., April 29; assisted by Dr. Anderson, Dr. William H. Van Patten giving the anæsthetic.

The operation. The bladder was dissected from and out of the anterior laceration; a curettage done; the two cartilaginous digits amputated; the uterine laceration co-apted; then the bladder elevated, where to my surprise was found an abscess retrovesical and extending upward. Having excised a V-shaped surface for remedying cystocele, base being toward body of uterus, I inserted drainage into this abscess cavity, sutured base to body of uterus above ruptured fundus, then repaired sphincter ani and sealed perineum.

Having all instruments resterilized, gowns

and gloves changed, the abdomen was opened. The peritoneum covering the abscess not having been punctured by operation from below, a plication was speedily done and both Fallopian tubes ligated with chromicized catgut near the uterine cornua in order to postpone an early pregnancy. Sterilization for religious reasons was not attempted, yet should have been for surgical ones. According to Frænkal (Arch. f. Gyn., 1889, Bd. 58, p. 374) and Fritsch (Centrəlbe, f. Gyn., 1897, Bd. 21, p. 1228) after the catgut absorption pregnancy takes place within a year or two. Therefore owing to the albuminuria being present in two previous pregnancies, and the necessity of amputating cervix, and abscess present, I seemed justified in ligating the tubes though sterilization should have supervened. She had a chronic appendicitis, but owing to the length of operation required (one and one-half hours) it was not removed.

On the second day after operation albumen appeared in urine, granular cysts being present, quantity of urine decreased gradually until six hours before death, when anuria supervened.

The autopsy. Lungs normal; heart, blood-clots in right auricle and ventricle; liver normal; gall-bladder distended with bile; small intestines, evidences of gaseous distentions (the body was embalmed); cæcum full of fæcal matters; appendix adherent, due to chronic appendicitis; plication of right broad ligament contracted from plastic inflammation, therefore uterus drawn to that side; left broad ligament relaxed; site of plication, firm union, no pus; Fallopian tubes, two chromicized catgut sutures *in situ;* kidneys, both very large, capsule non-adherent, ecchymotic spots and white irregular areas in the cortex.

The plication was not responsible for this fatality. If there was any septic intoxication, it came from the prevesical space and dissected under the peritoneum from the post-vesical abscess.

Of the number submitting to the plication method two were in the second month of pregnancy. These women submitted to this operation with a full knowledge of their condition, in the hope of preventing habitual abortions, which occurred usually at the third month. Both women had a successful gestation and parturition and I hereby exhibit the photographs of these children.

That the round ligament assumes its natural position after a plication operation, I was able to demonstrate in two cases. One (Miss G. H.) six months after her operation had to submit to a second operation for cystic ovary. Both round ligaments were in their normal place.

In the second case, operation for acute appendicitis (she having refused to have appendix removed at plication operation), both round ligaments were in their accustomed position.

If Sobotta is correct that the round ligaments are continuations of the uterine musculature, such muscle action will liberate the ligament and restore it to its normal function.

At the first some of my patients complained of a drawing sensation in both sides, due no doubt to an undue tenseness of the plication. A perfection of technique eliminated further inconvenience on this point.

I conclude that the plication method comes near a perfect method in all cases of uterine retroversion in that it restores the organ to its normal moorings; it permits it to functionate normally by permitting unimpaired gestation and parturition, and adding its iota to frustrate a diminished birthrate which now-a-days is all too prevalent, as well as depriving the professional abortionist of any pretext for pseudo-scientific reason to execute the deed on the score of adherent uterus, etc.

Likewise I may state perhaps that in those cases of general ptosis, it is no doubt as unavailing as any other method.

The basic principle of the plication operation lies in the peritoneal structures. It thus can be applied with safety and success in child-bearing women. It meets all the requirements of any other method where abdominal cavity is opened, other pathological conditions to be remedied simultaneously. The round ligament assumes its natural position and function as proven by subsequent operations. What are the requirements of a true replacement operation and how far is this met by the broad ligament method? The following analysis of sixty-four cases, giving authentically the good and bad results, answers the question.

	Name	Age	Diagnosis	Operation	Results
1	Mrs. F. G.	31	General ptosis, uterine retroversion	Broad ligament plication	Fair, backache
2	Mrs. U. L.	42	Uterine retroversion	Broad ligament plication	Good
3	Mrs. J. B.	21	Uterine retroversion and ovarian cyst	Removal of cyst, broad ligament plication	Good
4	Miss S. S.	18	Uterine retroversion	Broad ligament plication	Good
5	Mrs. O. H.	24	Habitual abortion from retroversion	Broad ligament plication 3 mos. of pregnancy	Normal birth at term
6	Mrs. D. B.	39	Appendicitis and retroversion	Appendectomy and broad ligament plication	Good
7	Mrs. A. F.	27	Uterine fibroid	Excised, broad ligament plication	Good
8	Mrs. I. K.	23	Uterine retroversion	Broad ligament plication	Good
9	Miss E. O.	27	Pyosalpynx, retroversion	Excised pus tube, broad ligament plication	Good
10	Mrs. J. T.	39	Chronic appendicitis, retroversion	Appendectomy, broad ligament plication	Good
11	Mrs. A. D.	37	Retroversion, chronic adhesions	Broad ligament plication	Good
12	Mrs. S. S.	24	Retroversion	Broad ligament plication	Good
13	Mrs. A. W.	29	Pyosalpynx, retroversion	Removal tube, broad ligament plication	Good
14	Mrs. H. T.	39	Habitual abortion, retroversion	Broad ligament plication	Well
15	Mrs. B. O.	42	Retroversion, metrorrhagic	Broad ligament plication	Good
16	Miss D. A.	19	Dysmenorrhœa and retroversion	Broad ligament plication	Good
17	Mrs. J. D.	27	Chronic salpingitis, retroversion	Removal tubes, broad ligament plication	Good
18	Miss K. S.	24	Nervous wreck, retroversion	Broad ligament plication	Mind normal, good
19	Miss A. R.	27	Retroversion	Broad ligament plication	Good
20	Mrs. D. J.	33	Abscess of right ovary, retroversion	Removal of ovary, broad ligament plication	Good
21	Mrs. P. H.	39	Retroversion	Broad ligament plication	Good
22	Mrs. O. D.	36	Uterine retroversion	Broad ligament plication	Good
23	Miss E. B.	21	Appendicitis, retroversion	Appendectomy, broad ligament plication	Good
24	Mrs. J. M.	32	Hysteria, retroversion	Broad ligament plication	Mental improvement, failure
25	Mrs. J. H.	32	Neurasthenia, retroversion	Broad ligament plication	Mentally well, good
26	Mrs. H. W.	31	Retroversion	Broad ligament plication	Good
27	Miss J.	26	Hydrosalpynx adhesions, retroversion	Removal, broad ligament plication	Good
28	Miss A. W.	29	Retroversion	Broad ligament plication	Good
29	Mrs. A. C.	42	Retroversion, cancer of cæcum	Broad ligament plication, excision of cæcum	Good, well after 1 yr. 9 mos.
30	Mrs. D. C.	40	Ovarian cyst, retroversion	Removal, broad ligament plication	Good
31	Mrs. F. M.	31	Sarcoma of ovary, retroversion	Removal broad ligament plication	Good
32	Mrs. B. K.	27	Retroversion	Broad ligament plication	Good
33	Mrs. A. K.	33	Adhesions, retroversion	Broad ligament plication	Good
34	Mrs. O. C.	36	Chronic adhesions, retroversion	Broad ligament plication	Good
35	Mrs. J. C.	30	Broad ligament cyst, retroversion	Removal, broad ligament plication	Good
36	Mrs. A. D.	43	Retroversion	Broad ligament plication	Fair, backache
37	Mrs. K. F.	40	Hysteria, retroversion	Broad ligament plication	Mental balances regained, good
38	Mrs. N. H.	44	Retroversion	Broad ligament plication	Good
39	Mrs.	45	Uterine retroversion	Broad ligament plication	
40	Mrs. B. D.	33	Infantile uterus, retroverted	Broad ligament plication	Good
41	Miss M. S.	24	Pyosalpynx, retroversion	Removal, broad ligament plication	Good
42	Mrs. W. T.	27	Pus tube, retroversion	Removal, broad ligament plication	Good
43	Mrs. F. W	32	Habitual abortion, retroversion	Broad ligament plication	Good
44	Mrs. A. W.	32	Melancholic retroversion	Broad ligament plication	Good
45	Mrs. A. L.	40	Fibroids, retroversion	Enucleated fibroids, broad ligament plication	Good
46	Mrs. M. W.	29	Laceration of cervix and perineum, retro version	Repaired broad ligament plication	Good
47	Miss E. S.	17	Retroversion, relaxed pelvis	Broad ligament plication	Failure
48	Mrs. J. Y	29	Double pus tube, retroversion	Removal, broad ligament plication	Good
49	Miss A. R.	24	Cyst of right ovary, retroversion	Removal, broad ligament plication	Good
50	Mrs. J. B.	37	Lacermoid cyst, retroversion	Removal, broad ligament plication	Good
51	Miss J. B.	36	Cystoma left ovary, retroversion	Removal, broad ligament plication	Good
52	Mrs. J. M.	32	Neurasthenia, retroversion	Broad ligament plication	Failure
53	Mrs. F. B.	36	Insane, adhesions, retroversion	Broad ligament plication	Recovery
54	Mrs. J. D.	39	Retroversion, chronic appendicitis	Appendectomy, broad ligament plication	Recovery, good
55	Miss A. Z.	43	Retroversion, chronic adhesions	Broad ligament plication	Good
56	Mrs. K. G.	23	Chronic appendicitis, retroversion	Appendectomy, broad ligament plication	Good
57	Miss A. P.	21	Cystoma of ovary, retroversion	Removal, broad ligament plication	Good
58	Mrs. F. W.	32	Habitual abortion, pregnant 3 mos., retroversion	Broad ligament plication	Birth of child at term
59	Mrs. W. T.	27	Pus tube right side, ovarian abscess on left, retroversion	Removal, broad ligament plication	Good
60	Mrs. A. W.	32	Retroversion	Broad ligament plication	
61	Mrs. M. W.	29	Laceration cervix perineum, retroversion	Repaired, broad ligament plication	Good
62	Miss V. P.	24	Hyperchlorhydria, retroversion	Broad ligament plication	Recovery of both ailments
63	Miss G. H.	22	Chronic endometritis, retroversion	Curettage, broad ligament plication	Good
64	Mrs. K. Q.	33	Complete laceration of cervix into uterus, also perineum	Amputation of cervix, broad ligament plication	Fatal

PRIMARY IMPLANTATION OF AN OVUM IN THE PELVIC PERITONEUM

By BARTON COOKE HIRST, M. D., and NORMAN KNIPE, M. D.

AN editorial in the British Medical Journal of 1903, (page 562), states that Witthauer was the first to observe and describe an indubitable case of primary implantation of a fertilized ovum in the peritoneum of the abdominal cavity.

Galabin wrote to the editor of the Journal, (page 664) calling attention to the case he had reported in the London Obstetrical Society Transactions in 1896.

These two are the only cases accepted to the present time by the majority of scientific students of this subject. To this number we can add a third, more clearly demonstrating the possibility of primary implantation of a fertilized ovum in the peritoneum, than either of the other two.

GALABIN'S CASE. Patient age 27 years. Had three children, the last eleven months old which she was suckling at the time of rupture. In November and December, scanty but apparently normal menstruation occurred for the first time since delivery. On January 14th on getting out of bed in the morning, she was suddenly attacked with severe abdominal pain and fainted.

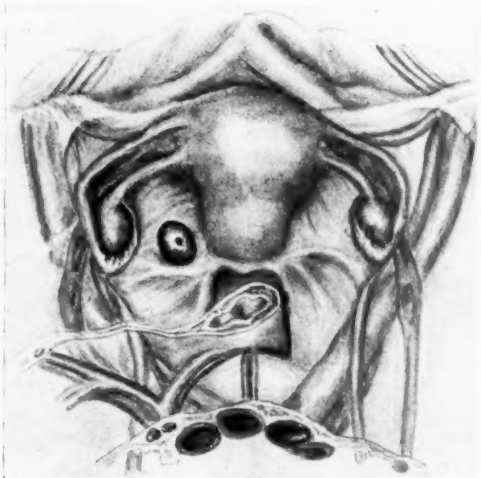


Fig. 1. The ovum imbedded under the peritoneum of the broad ligament.

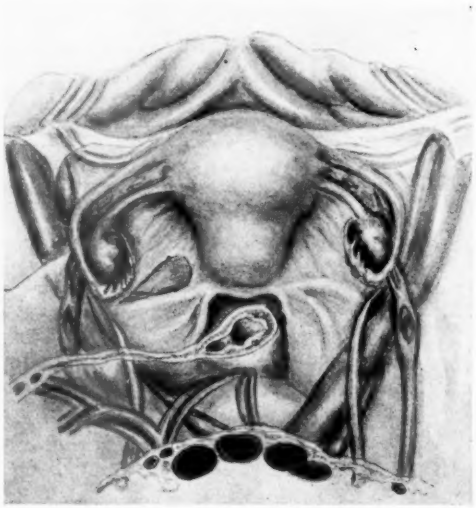


Fig. 2. Raw surface left after removal of the ovum from its bed.

Pain and collapse increasing, she was operated upon on January 16th. Peritoneal cavity found full of clots and blood, which were washed out. A mass of adherent blood clots, containing placental tissue was removed from a ragged cavity in the posterior part of the right broad ligament, at its lower part. It was found that bleeding still continued from the interior of the extra-uterine sac, which extended across the back of the uterus and both broad ligaments. This was checked only by packing the whole pelvis with iodoform gauze. The patient later died." Autopsy disclosed the following conditions:

The gestation sac was placed between the uterus and the rectum occupying the whole of the pouch of Douglas. The fœtus was two and a quarter inches long, the development corresponding to the tenth week of normal intra-uterine gestation.

A committee of the Obstetrical Society reported upon Galabin's paper as follows:

1. The preperation *is not* the result of a tubal gestation ending in rupture either into the peritoneal cavity or the broad ligament.

2. If an example of tubal abortion, the abortion must have occurred at a very early

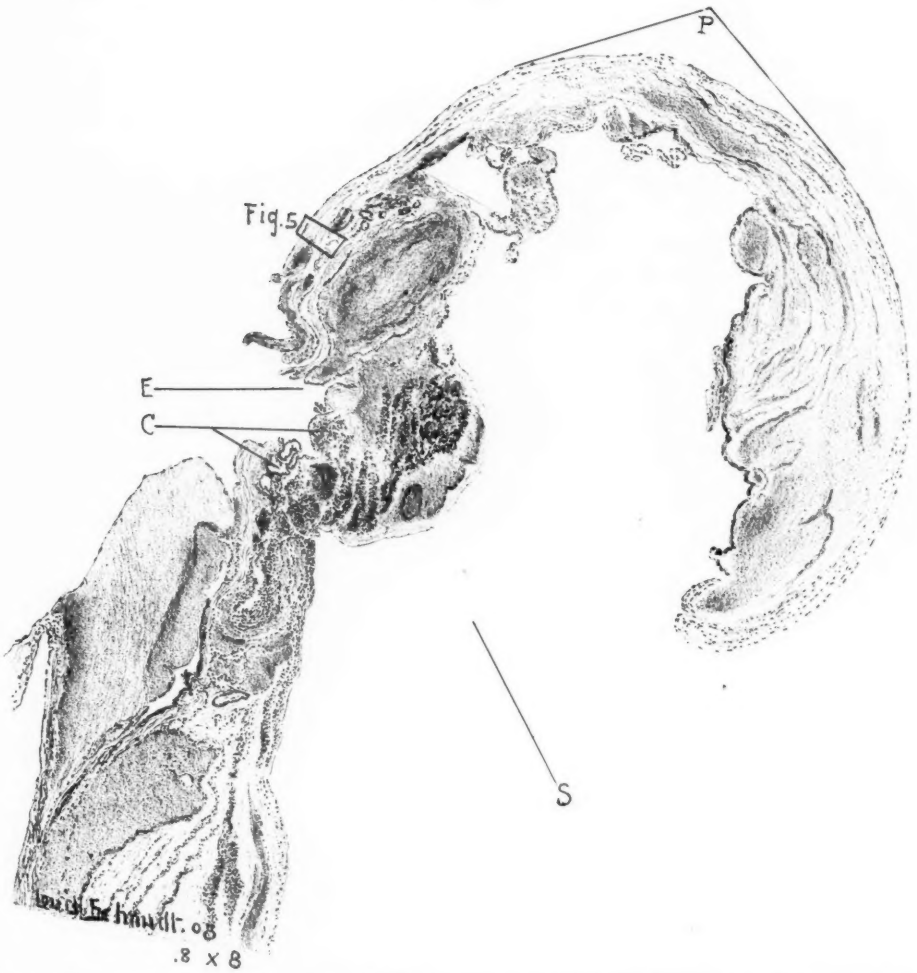


Fig. 3. Transverse section of the ovum. P, peritoneum. E, point of erosion. C, chorionic villi. S, point where the ovum was separated from the connective tissue of the broad ligament.

stage of gestation, and the ovum must have been completely transplanted to the bottom of pouch of Douglas and continued its development in that situation. Further, it is necessary to assume that the Fallopian tube, under these circumstances, must have resumed its normal condition.

3. It is possibly a primary ovarian pregnancy, the sac of which has burrowed between the layers of the broad ligaments, leading to distention and growth of a limited portion of the pelvic peritoneum. In favor of this view is the histological structure of the wall of the gestation sac; while against it is the fact that a space of fully three-quarters of an inch of normal broad ligaments exists between the right ovary and the previously described pit which represents the placental site.

4. It is more likely an example of primary abdominal gestation.

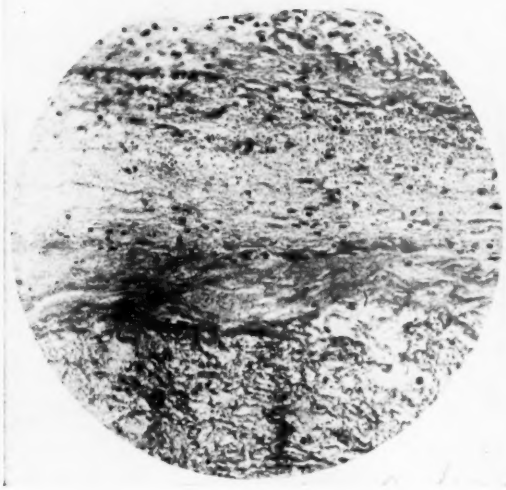


Fig. 4. Photo-micrograph of decidual cells shown in drawing (Fig. 5).

WITTHAUER'S CASE. Woman 23 years of age. Menstrual flow commenced six weeks after her second pregnancy but ceased ten months later. In six weeks an irregular discharge of powdery dark blood was noted accompanied by violent pain and anæmia. Tumor detected in Douglas' pouch and the right fornix. Symptoms of internal hæmorrhage.

Operation. Two pints of blood and clots found free in peritoneal cavity. Tag of omentum found adherent to pelvic viscera to right of uterus. Right ovary converted into cystic tumor size of hen's egg. Removed with healthy tube. Left appendage healthy; uterus not appreciably enlarged. No source of hæmorrhage detected in uterus or appendages, but in a rolled up piece of omentum which adhered to pelvic organs was a small hæmatoma described as of the thickness of thumb. The hæmatoma was found to contain abundant chorionic villi enclosed in a capsule of clot, itself incapsulated in omentum. The embryo had escaped. The corresponding Fallopian tube was healthy, patent, undilated and no chorionic villi were detected in the walls.

AUTHOR'S CASE. Patient age 31. Had one child seven months ago; labor not unusually difficult. No miscarriages.

Previous history. Menses began at 14 years, always regular and normal.

Family history. Negative.

Present history. Menstruation recurred twice a month, three months after the birth of her child which she is still nursing. Six days before admission to the hospital she says she again began menstruating. Bloody discharge has continued all week. On the sixth day of the flow as she was stooping over she was seized with a pain in her lower abdomen so severe as to make her faint. Pain and syncope recurred six times during the evening.

Operation. March 27, 1907; on opening the abdomen free blood in moderate quantities was found in Douglas' pouch. On the posterior surface of the left broad ligament, above and to the outer side of the uterosacral ligament, was a spherical tumor, with a small orifice on its surface, from which blood was exuding (Fig. 1). The tubes, ovaries, uterus, and the remainder of the broad ligaments were perfectly normal. The tumor was covered with peritoneum. It was dug out of its bed and in doing so a strip of peritoneum was torn off the broad ligament (Fig. 2.) On opening the tumor at the point where it was imbedded in the connective tissue of the broad ligament, a minute embryo was discovered. The raw surface left on the broad ligament after the removal of the ovum was closed with a running stitch of catgut. It was not necessary to ligate any blood vessels.

The patient made an excellent recovery, and was discharged April 11, 1907.

Microscopical. The capsule consists of an outer and inner layer of fibrous connective tissue between which an extensive extravasation of blood has taken place.

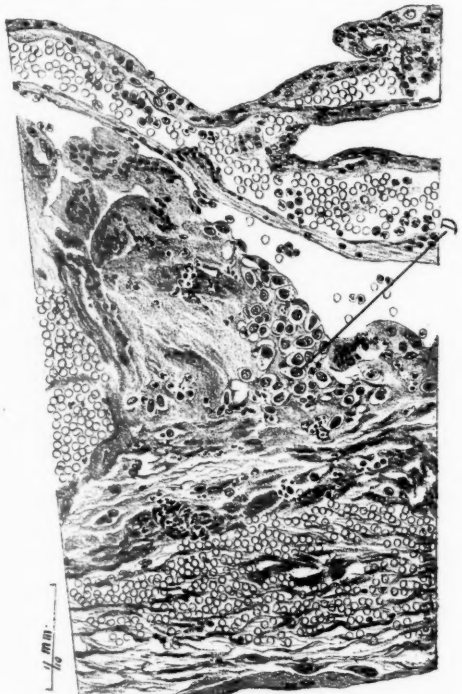


Fig. 5. Decidual cell development in connective tissue of the broad ligament. D, decidual cells.

Fig. 6. Point of erosion. Chorionic villi and blood clot.

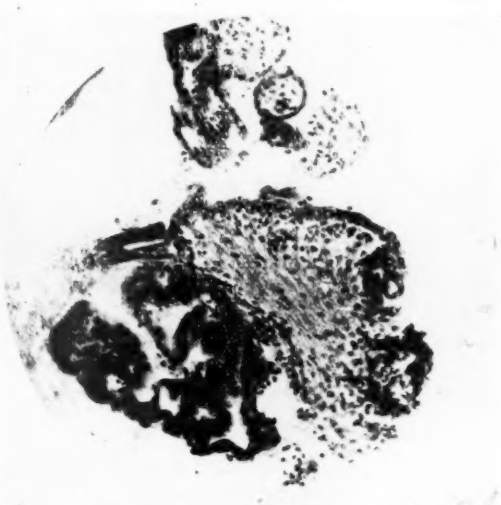


Fig. 7. Enlargement of chorionic villi shown in Fig. 6.

Around two-thirds of the periphery of the ovum may be distinguished nuclei of the endothelial cells of the peritoneum (decidua reflexa). Throughout the extravasated blood are numerous trabeculæ of fibrin (Fig. 3).

The nuclei of the connective tissue cells, though larger than one would expect to find, vary greatly in size. Here and there areas are found where the cells and nuclei are extremely hypertrophied and distinctly decidual in type (Figs. 4 and 5). At the point of erosion chorion villi are seen protruding into the orifice and surrounded by clotted blood (Figs. 6 and 7).

In order to substantiate the claim that there has been a primary implantation of the ovum in the peritoneum, there must be:

1. A normal condition of the tubes, ovaries, and broad ligaments, except where the ovum is implanted.

2. No penetrations of the intraligamentary space from the ovarian fimbria.

3. No intraligamentary rupture of the tube.

4. No escape of the ovum from the uterine cavity.

5. Proof that the peritoneum constitutes the reflexa of the ovum.

The specimen we describe answers all these requirements.

REFERENCES

WITTHAUER. Zentralbl. fur Gynak., Leipz., 1903, vol. xxvii, p. 136.

GALABIN. Brit. Med. Jr., Lond., 1903, vol. i, p. 664; also Tr. Obst. Soc., London, vol. xxxviii, 1896.

HERMAN. Bull. Acad. roy. de med. de Belg., Brux., 1904, 4th ser.

RIDDELL. Lancet, Lond., 1905, p. 1184.

REED. Lancet - Clinic, Cincin., 1905, n.s., p. 381.

ESTES. Penn. Med. Journal, 1902, vol. vi, p. 393.

NOBLE. Tr. Coll. Phys., Phila., 1903, 3d ser., vol. xxv, p. 19.

REED. Amer. Jour. Obst., 1906, vol. liii, p. 205.

FOURNIER. Bull. Soc. d'obst. de Par., 1905, vol. viii, p. 6.

NEBESKY. Zentralblatt f. Gynak., Leipz., 1904, vol. xxviii, p. 197.

MURPHY. Annal. Surg., Philadelphia, 1904, vol. xxxix, p. 464.

HERMAN. Bull. Acad. roy. de méd. de Belg., Brux., 1904, 4th ser., vol. xviii.

STRONG. Carolina Med. Jour., Charlotte, 1904, vol. i, p. 723.

LINCK. Monatschr. f. Geburtsch. u. Gynäk., Berlin, 1904, vol. xx.

MEYER. Intercolon. M. J. Australas., Melbourne, 1905, vol. x, p. 145.

BEALE. Med. Press and Circ., Lond., 1906, n.s., vol. lxxxii, p. 360.

STURMER. Tr. Obst. Soc. Lond., 1905, vol. xlvi, p. 385

VALLOIS. Bull. Soc., d'obst. de Par., 1904, vol. vii, p. 315.

RONGINSKY. Med. Record, N. Y., 1905, vol. lxviii, p. 501.

VALDAGNI. Ginecologia, Firenze, 1905, vol. ii.

HARGRAVE. Virginia M. Semi-Month., 1906, vol. xi, p. 317.

MARTIN. Munchen. med. Wochenschr., 1906, vol. liii, p. 1659.

MACLEAN. Journ. Obst. and Gynæc. Br. Emp., 1906, vol. ix, p. 434.

PRIMARY CARCINOMA OF THE BODY OF THE UTERUS

Report of a Case with Perforation of the Wall

By C. N. BALLARD, M. D., Chicago, Illinois

THE object in presenting this paper is to encourage a more extensive study of the subject of carcinoma and to present a case which has been of special interest to me. If this study will create a little enthusiasm in the minds of some who are fully qualified to push the investigation still further, I shall feel that much has been accomplished by my effort in this direction.

I am sure of my assertion when I say that there is not one of you who has not felt the remorse following a neglected case of carcinoma of the body of the uterus.

But little information can be obtained from the literature of any country prior to 1890. Even much of the recent literature is undecided and unsatisfactory because it is difficult to make a diagnosis of cancer of the uterus. The exact cause of tumor growth is not known, and with such a limited knowledge of the etiology of uterine cancer, we are left to depend upon the histogenesis of the cell for our classification.

According to Bilroth, we may class all the tumors of the uterus which are of a typical epithelial formation as "carcinoma epithelial and carcinoma glandular." Virchow says that in those organs which are disposed to primary growths, secondary growths are rare. How very seldom secondary growths involve the uterus, even when the primary growth of other organs is widely extended! Wagner has found only five cases of secondary tumor growths in the uterus.

The nomenclature of tumors depends largely upon the origin and characteristics of the cell from which the tumor springs. In the body of the uterus we have the columnar epithelium of the glands and also upon the surface of the cavity; hovering about the external os and covering the vaginal aspect of the cervix is stratified squamous epithelium. These are the only kinds of epithelium from which primary tumor growths could originate in the uterus. From the glands would spring a cylindrical cell or glandular carcinoma; from the cervix a squamous cell epithelioma. Any primary carcinomatous growth other than these two kinds would be due to migratory cells or to metaplasia.

From H. B. Deale I find this quotation: "The term cancer is applied to a number of pathological conditions presenting marked differences as regards both their macroscopic and microscopic appearances. They have diversified symptoms and varying degrees of malignancy. Practically every cancer is a mass of actively growing cells. These are the product of pre-existing cells which are normal elements of healthy tissue. One kind of cancer differs from another merely in respect to the particular kind of cell which proves to be the starting-point of the tumor.

The growth of cancerous tumors is at the expense of the surrounding tissues. They have a double food supply: they absorb the nutritious elements elaborated for the healthy, normal tissue, and they destroy in some unknown way the tissues themselves for their own maintenance.

The absence of epithelium from any other mucous membrane of the body would be considered pathological, but its absence from the uterine mucosa occurs physiologically, as in early puerperium. Its absence is found in puerperal atrophy and in pyometra. The epithelium is not absent to any extent during menstruation; but it becomes changed in form by pressure or stretching of the mucosa in hydrometra and in hæmatometra, in which conditions the columnar epithelium becomes very much flattened like squamous cells.

A very remarkable deviation from the simple columnar epithelial covering of the uterine mucosa was observed by Gartier and he reported a case at the International Medical Convention at Geneva. He found a uterus which was lined with pavement cells in the fundus. This phenomenon was later described by Zeller, who in 1884 reported 63 cases in which he had found squamous epithelium lining the

fundus of the uterus. Up to this time cancer of the body of the uterus originating other than from columnar epithelium was unthought of. Even after Zeller's description it was doubted and given little consideration until Piering, in 1887, published a case of cancroid of the body of the uterus. This opened a gateway for further investigation, and since then much importance has been given to the occurrence of stratified squamous epithelium on the mucous membrane of the body of the uterus.

Gebhardt says that "carcinoma of the body of the uterus appears in two forms, which can be distinguished from each other without much difficulty if the stages are not too far advanced." The first takes the form of an alveolar carcinoma and arises by an extension of the lamina of the glands and the infiltration of the latter with epithelium. There are two processes which are sharply defined: one list of cases concerns itself with a metaplasia of the cylinder epithelium of the upper surface of the uterine cavity into a many layered pavement cell epithelium whose upper stratum may be very horny. This horny surface may be caused by chronic irritation, either mechanical or chemical, or it may be of a mycotic nature. The epithelium never reaches any great thickness and a typical reproduction in the form of cones which force themselves into the underlying tissue never takes place. In fact, the whole process is of a mild character.

The other list comprises a series of cases that are more rare. Here there is a new growth of pavement epithelium upon the upper surface of the body of the uterus and upon the cervix, and it has a decided tendency to send cones into the depth of the tissues. The cells at different stages show a progressive and retrogressive metamorphosis, as if seized with extreme mitosis. New tissues arise and are destroyed in quick succession. This certainly is a malignant carcinomatous new growth.

In 1895 Reis reports two cases of chronic inversion of the uterus and cervical polypi extending into the vagina, the exposed surfaces of which were covered with stratified squamous epithelium. He further observed that the stratified epithelium was not thrown off during menstruation, but only broken through in places to allow the escape of blood which had accumulated beneath.

Williams, in his lectures on cancers of the uterus in 1886, describes a case of cervical polypus, the lower end of which was covered with squamous epithelium, and processes were sent down into the substance of the polypus and into the glands. He named it a squamous epithelioma.

In the cases above referred to, the mucous membrane in question occupied an abnormal situation; the surface usually covered with columnar epithelium lies near mucous membrane covered by squamous epithelium, is exposed to the air or both. Has this exposure any influence toward changing the epithelial covering? This question has evoked many answers of more or less importance.

Every organ seems to have its own peculiar form of cancer. The uterus is no exception to the rule. The typical cancer structure is made up of alveoli, which in their simpler forms consist of the glands normally found in the mucous membrane lining the cavity of the uterus. The glands increase in number and size.

Examination of many specimens appears to prove that at least the majority of cases of cancer of the uterine body develop progressively through stages which begin with malignant adenoma and pass through bizarre forms of evolution of the uterine glands into an ordinary spheroidal-celled carcinoma. Any of the stages may be missed. They may also persist for a considerable time; for instance, a tumor of some standing may, as rarely happens, show the structure of a malignant adenoma, yet more commonly, however, the earliest stage observed is that of adenocarcinoma. This may persist for a considerable length of time. As a rule, evidence of evolution may be observed in different parts of the same tumor. Generally, the most advanced stages can be seen in the oldest and deepest parts of the growth, while in the growing portion the earliest stages are seen. There are all degrees of structure from the simplest endometritis to the most malignant cancer.

It is often difficult to distinguish the tissues undergoing the change into malignancy, and it is necessary to have many portions of the tissue for comparison. A great increase in

the gland-like spaces is an important feature in malignant adenoma and adenocarcinoma; yet this in uncertain as it occurs often in endometritis. In the latter condition, however, the superficial part of the mucous membrane contains but a few glands, hence a large increase of glands here would look suspicious. In a malignant tumor there are many divisions of the glandular acini, while in endometritis the division is limited. Hence a marked subdivision of the glands would point strongly toward malignancy. In marked malignant adenoma the glands are so close together as to be separated by only a single row of connective tissue cells.

In simple endometritis the glands are vertical to the surface, while in a malignant condition they run in various directions. In the one case they can be distinctly outlined, but in malignancy they increase so much that they form a complex network in which the individual glands cannot be distinguished.

Cancer in the body of the uterus is said to develop in two ways: either from the glands or from the surface epithelium. That from the surface begins by an increase of the layers of epithelium, the upper layers developing as a horny layer as in squamous epithelioma. Processes beginning in the deeper layers penetrate the muscular tissue of the organ giving rise to a squamous epithelioma the same as would arise from the vaginal aspect of the cervix. Sometimes only the first stage of the process takes place, and the epithelium becomes stratified, squamous and keratoid; the surface appears light and scaly. This condition is known as ichthyosis uteri.

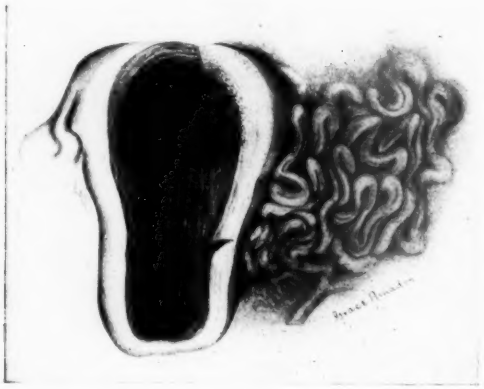


Fig. 1. Drawing showing mass at upper end near cornu.

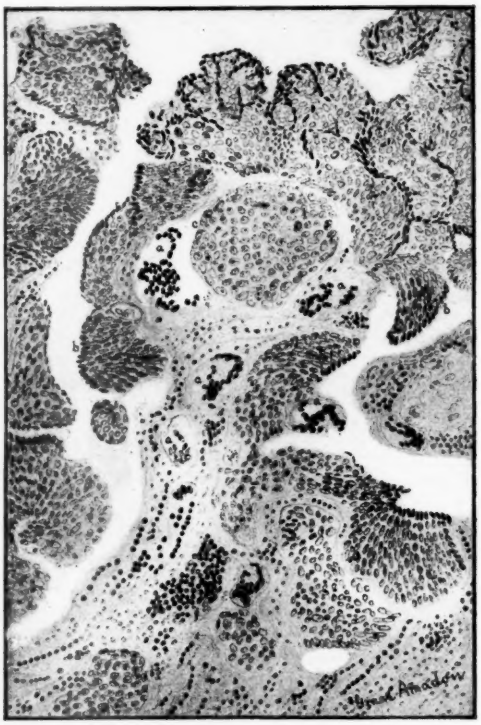


Fig. 2. Drawing from microscopical section. *a*. Giant cells. *b*. Columnar cell mass. *c*. Squamous cell mass. *e*. Vegetations with "comma" nuclei. *f*. Lymphoid cell infiltration.

We can readily see how a true squamous epithelium could be formed from this altered surface epithelium. Nine cases referred to by Gebhardt were formed in this way.

The more common form of development is that which occurs from the older portions of an ordinary adenocarcinoma. Groups of cells in the central portion of the alveoli undergo a hyaline change; the nuclei become changed; they become swollen, stain less deeply and more diffusely than usual and break up into irregular fragments and granules. These degenerated cells arrange themselves into nests and frequently present the appearance of epithelial pearls, such as are typical in

squamous epithelioma. All the intermediate stages can be followed sometimes, from the adenocarcinoma to the imitation of the pavement celled epithelioma.

REPORT OF CASE

The case which I wish to report has the following history:

CASE of Mrs. M., aged 70; occupation, housework; married 50 years; has given birth to four children, all of which are living and well. Births were all normal, there were no miscarriages and the recoveries were uneventful. Her father died at the age of 79 with rheumatism; mother died at the age of 74, cause of death not known, but it was not cancer in any form. Patient has one brother who is living and well and three sisters, one of whom died at the age of 86 with pneumonia — the others are alive and well.

Patient began to menstruate at the age of 15, was always regular and normal. Menopause occurred at 45 years, since which time she has never had leukorrhœa nor any bloody discharge. She has been free from anæmia and cachexia. The organs of nutrition and circulation are normal. The principal sicknesses during her life were children's diseases. Nothing in her family history indicates a hereditary tendency to any disease.

In 1901 the patient fell from a street-car, alighting in a lateral sitting position, and fracturing the neck of the femur. The accident confined her to the house for about two years. She was able to walk but not without crutch and cane. After she had sufficiently recovered to be about her apartments again, she noticed a different feeling in the pelvic region, a sense of weight. This symptom was slight at first, but grew more severe. She noticed that the recumbent position gave her relief, but no examination was made until the present illness occurred.

In March, 1906, I was called to see her and I found that she had had a profuse hæmorrhage following a little extra exertion in attempting to lift a piece of furniture. I made a careful examination and found the cervix and body of the uterus normal in position, size, and consistency, with a normal appearance at the external os. The organ was movable and showed no pain nor tenderness during the examination. The only abnormality noticed was a slight fulness especially marked on the left side.

Proper precautions were taken as regards the hæmorrhage, which ceased in a few days and the patient recovered sufficiently to be about her apartments again. But after another little exertion a second hæmorrhage occurred, and a third one within three weeks, the last ones more profuse than the preceding ones. I influenced my patient to go to the hospital for a curettage for diagnostic purposes. After the usual time for preparation she was taken to the operating room and anæsthetized. A thorough examination was made, and at first I found no more pathology than has been stated above, except possibly a more boggy feeling to the fulness at the side of the uterus. The careful use of the sound showed that the uterus was normal in depth and position. After dilating the cervix, a dull curette was carefully introduced and slowly moved about over the endometrium to detect if any abnormal tissue were present. At the point on the left side just above the internal os, the curette went through the uterine wall without the least resistance. Immediately there was a gush of blood which continued to flow freely and profusely. Not being able to fully appreciate the situation, and the condition seeming to be one of grave proportions, I at once proceeded to open the abdomen, the patient having previously prepared for a laparotomy.

I found the uterus normal in size and consistency, and practically free from adhesions. But the large fulness on the left side proved to be a mass of enlarged veins. These veins were massed so closely as to constrict somewhat the movements of the uterus. They were very much crowded together in the wall of the uterus as well as in the broad ligament. The point of the closest contact seemed to be at the point of the perforation.

While doing the hysterectomy — and it is always my preference to do an abdominal hysterectomy in case of cancer of the uterus — the place of the perforation was easily seen, and that it extended into the venous mass was most plainly shown. This demonstrated that the source of the hæmorrhage was from the varicose veins.

We would expect malignancy to be the cause of hæmorrhage from the uterus at this time of life, and this thought was uppermost in my mind when I began to operate, but so far no symptoms of such a condition had developed.

After the hysterectomy was completed, I made a longitudinal section of the organ and found the point of perforation on the left side. Here the uterine wall was thinner. The endometrium of the fundus was somewhat roughened, but otherwise there were no lesions in the mucous membrane nor in the wall. The local pathologist of the hospital made a microscopical examination of a section from the region of the perforation and reported that no malignancy was found. He made repeated examination of specimens taken from this region with the same results. Several examinations were made from specimens taken from the cervix, but nothing of a malignant character could be found. Not satisfied with these reports I continued to make more microscopical investigations, consulting several expert pathologists. Eventually the whole uterus

was cut up for examination. The fundus was found literally riddled with masses of malignant cells. These cell growths presented many bizarre forms and were not at all typical glandular proliferations. Some of the cell groups were made up of cylindrical cells, some of squamous cells and some of both varieties.

After making many sections of the malignant area, the region of the perforation and the cervix, the following is the histological description of the tumor:

DESCRIPTION OF THE GROSS SPECIMEN

The uterus measured 8.5 x 4 x 3 centimeters. On the left side, just above the level of the internal os, was a small mass of dilated vessels as large as a tea-cup. From the seat of this plexus a perforation extended down and inward through the wall of the uterus. The endometrium of the fundus was roughened by small, mossy vegetations of brownish color. This area was about two centimeters above the level of the perforation. The uterine wall was normal in thickness.

MICROSCOPICAL DESCRIPTION

In preparing the uterus for microscopical examination, the organ was cut into twelve small pieces, six for each half. These were prepared by the celloidin method and the sections were stained with hæmatoxilin and eosin; special stains were made for tubercle bacilli. Many sections were made of the cervix, the perforated area, and the fundus. The description will embody the following parts; 1. Uterine mucosa; 2. Glands; 3. Involuntary muscle and connective tissue; 4. Blood vessels and plexus; 5. Carcinomatous area; 6. Diagnosis.

Uterine mucosa. Under the microscope the mucosa showed an almost complete loss of epithelium. The exterior of the cervix had an intact layer of squamous epithelium, but there was no evidence of any proliferation. In the fundus of the uterus the mucous membrane had been replaced by a mossy, vegetative growth, which consisted of round and elongated masses of stratified epithelium. On closer examination these proved to be columnar-cell proliferations. The perforation had no mucous membrane; the surface was not ragged, but consisted of smooth, rounded elevations.

The epithelial cell mass in the fundus will be described later. Such a growth was not found in any other part of the uterus.

Glands. The uterine glands were few, but were present in all parts of the uterus below the carcinomatous area. Here there were no glands, and further, there was no connection between the adjacent glands and the proliferating cells. Some of the glands were occluded, the epithelium consisting of low, cuboidal cells. Others were dilated and filled with mucous-like substance. Glands were also present with the usual cylindrical epithelial lining. No glands gave evidence of any multiplication of their epithelial cells.

Muscle and connective tissue. The involuntary muscle was normal throughout the uterus except in and around the area of perforation. Here it was riddled with a somewhat degenerated connective tissue containing very few nuclei. The picture was one of broken-up strands of muscle intermingled with a homogeneous tissue which in places was almost barren of nuclei. With Van Gieson's stain this tissue gave the reaction of connective tissue.

Blood vessels. The blood vessels were atheromatous. Many had occluded lamina, especially on the right side. Those on the left side were, for the most part, congested; some were occluded. The hyperplasia of the intima was the most marked, although the media and adventitia were also thickened, and in cross section appeared as half-moon shaped thickenings of the intermediary layer of the intima. These changes were the most marked on the left side.

Carcinomatous area. The carcinoma cells formed small vegetations in the fundus of the uterus, which extended in irregular and oblong masses one-third the distance through the wall. Many of the masses were hollow; some were solid, consisting of the same kind of cell throughout; others contained a central mass of more deeply staining cells with comma-shaped nuclei. Tufts of these comma cells radiated from the center between the larger, paler staining carcinoma cells. The vegetations on the surface, especially, were characterized by this radiate appearance, due to the cells with comma-like nuclei being wedged in between the other cells. (See Oeri on Epithelmetaplasia in the Uterus.)

The proliferating cells, for the most part, had long nuclei; in some masses the border cells were distinctly columnar. Other masses were made up of cells with a large amount of protoplasm and round, vesicular nuclei — ordinary squamous cells. Certain places showed that the squamous cell masses were continuous with the columnar cell masses; nowhere were any pearls found. Karyokinetic figures were abundant; nuclear clumping also. Cells could be seen with large, oval nuclei packed with basic granules.

Large, giant cells, some with a hundred or more nuclei, were found around the cell masses. The nuclei were in the middle of some and on the border of others. In places these cells could be counted twenty and thirty together.

The other tissues present in the carcinomatous area consisted of broken strands of muscle (involuntary), connective tissue, and a small amount of lymphoid cell infiltration. Strings of lymphoid cells riddled the outer wall of the uterus, but not in great numbers. A few masses of lymphoid cells were scattered here and there. Special stains were made for tubercle bacilli, but none were found.

Diagnosis. Primary adenocarcinoma of the fundus of the uterus with numerous squamous-cell proliferations and multiple giant-cell formation.

REASONS FOR DIAGNOSIS

1. The majority of the cell masses consist of columnar-like cells.

2. Masses are found with distinct rows of columnar cells on their borders.

3. The comma-like cells in some of the nests are remnants of the original glandular epithelium (Oeri).

4. The hollow pegs of cells represent the transformed glands.

5. The masses with the central comma-like cells represent another stage of growth in which the original columnar epithelium lining the glands has been pushed to the surface by the undergrowth of the larger, paler carcinoma cells.

6. The absence of any epithelial pearls.

7. The absence of any cell proliferations in the cervix or at any point between the cervix and the fundus as evidenced by numerous sections.

A study of the microscopical sections (and as seen in the microscopical drawing, Fig. 2) shows that there are very important diagnoses to be made from the microscopical examination of uterine curettings. In this case there are several conditions that might easily mislead us in making a diagnosis if we were to depend upon the uterine scrapings.

A specimen taken from one portion might show only giant cells and lymphoid cells, which would be suggestive of tuberculosis; another portion would show columnar epithelial cells in nests and be diagnosed adenocarcinoma; a nest of squamous cells might present itself and a diagnosis of squamous-celled carcinoma be made; while, last, but not least, a specimen might be taken from the endometrium where there existed no malignancy and then a diagnosis of old endometritis might be made.

All of these diagnoses *were* made in this case by as many expert pathologists, even after the uterus was cut up into sections. I have given this point my most serious attention because of of the importance of examining every portion of the scrapings from the body of the uterus, and after sections have been made, not to be satisfied with a few sections but to make many sections from every part of the wall so as to make a diagnosis of early malignancy.

Dr. H. Eckhardt, in 1898, says that the simultaneous appearance of more than one malignant tumor on an organ is not uncommon, and especially so in the uterus. In the so-called "double" carcinoma the second tumor usually comes through the lymphatics by metastasis, or in a mechanical manner. Eckhardt cites a case of adeno-carcinoma and squamous-celled cancer in the fundus uteri. The patient was 53 years old; had suffered a mucous abrasion in consequence of a strong metrorrhagia in her 48th year. The patient was very corpulent, weighing 280 pounds. The operation was a total extirpation of the uterus, and by examination it was found that in the cavity no tumor growth was present, it having been removed by the diagnostic curettage. In the posterior wall, however, was an opening the size of a hazel-nut, which gave evidence that a new growth had had its origin there. Microscopical examination showed a direct transformation — a metaplasia of the gland-lining of cylindrical epithelium into squamous epithelium.

In 1894 Haufmann reports a case of a peculiar form of carcinomatous degeneration of the endometrium of the body of the uterus. The patient was 64 years old. Extirpation of the uterus and microscopical examination were made. In the body of the uterus, and confined entirely to it, were two distinctly different carcinomatous growths. One was an adenocarcinoma; the cells of the glandular proliferation had taken fast hold upon the mucous membrane of the wall. They were very numerous, arranged irregularly and mostly in thick layers, sometimes not clearly separated from each other. In some places they showed a less transparent body, and a thicker nucleus, resembling the cylinder cells originally found in the glands of the uterus.

The other growth was a squamous-celled epithelioma. From its epithelial covering sprang a horn, or second tumor, which penetrated the wall of the uterus.

Metaplasia of the single-layered cylindrical epithelium of the endometrium to a many-layered squamous epithelium, which may produce the horned variety, was first observed by Zeller and Keüslner in cases of endometritis.

One characteristic of this metaplasia is the radical change of the stroma of the uterus — the change of a soft, lymphatic, mucous membrane into a hard, dry tissue on which the columnar epithelium cannot thrive because it is so tender.

Rosenstein reports a case of a woman, aged 69 years, whose uterus was extirpated and showed an adenocarcinoma of the body, and at the same time a metaplasia of the cylinder

epithelium to a many-layered squamous epithelial growth.

A few quotations of the literature up to the present time will give some knowledge of its advancement. Beyea, in an article written in 1896, says that the history of primary malignant disease of the corpus uteri is comparatively brief. The first reference to be found in the literature was in a monograph on carcinoma of the uterus by Wagner, in 1858. The text-books from 1860 to 1875 scarcely mention it as being possible. Veit, in 1868. and Scanzani and Beigel in 1875, mention it. but doubt its primary origin in the body of the uterus. They state that the symptoms did not differ from those of advanced carcinoma of the cervix and that a correct diagnosis could only be made by destroying the cervix.

Gusserow stated in a clinical report that the existence of primary carcinoma of the body of the uterus could not be denied, but that it must be very rare. Arnott, writing in 1860 on the results of 57 post-mortems of patients dying from uterine cancer, mentions one "remarkable case" in which the cervix was free.

In 1876, Shatz observed 2 cases affecting the body in a total of eight cases of cancer of the uterus.

The first clinical picture appeared in Schræder's text-book in 1874. He says: "We know that carcinoma of the body of the uterus is much less frequent than carcinoma of the cervix; but what is not known is the relative frequency." Authorities differ widely. Szukits cites 420 cases of carcinoma of the uterus, and among them found only one isolated carcinoma of the body and fundus. Blau, on the other hand, reports 93 cases and 6 of them were from the fundus.

Adding together the cases of Blau, Eppinger, Sebert, Szukits and Willigh, we find reported 686 cases of carcinoma of the uterus and of these 13 are credited to the body, not quite 2½ per cent.

Ruge and Veit, in their extensive work on carcinoma of the uterus (fundus) have established the anatomical and histological principles of the adenocarcinoma of the body. They gave a complete anatomical and clinical study of the 21 cases and the report of 22 other cases which were authentic; these were taken from the literature up to their time. Although 26 years have passed since they observed and wrote, and the self-same theme has been incessantly discussed by other authors, still today, the principles which they advocated are the foundation of all our knowledge on the subject. In describing one case, they speak of "the cylinder epithelium of single glands being changed into a many-layered epitheliodal tissue."

The statistics regarding the relative frequency of primary carcinoma of the fundus uteri are variable and subject to error. This is obvious, for one may see many cases and another none at all. Ferrous found 1 case in 16; Forget, 1 in 16.5; Sobert, 1 in 18.5; Wellecks, 1 in 54; Schræder, 1 in 50.

Gusserow says that "isolated carcinoma of the body and fundus was, until lately, a disease of which little was known." Pichot gathered 44 cases from French and English literature, and up to 1878, 36 more had been observed. This gives a total of 80 cases. Since then other cases have been published, so that up to 1886 we have 122 cases in all. In this same year, Williams says that he had seen only 7 positive cases. Caldrew, out of 150 cases, diagnosed, microscopically, 8 as being primary of the body. Schmidt reports 9 out of 39 cases. Coe, among 9,000 patients at the Woman's Hospital in New York, found 15 cases of primary carcinoma of the body of the uterus. 6 positive cases are reported at the Gynecian University Hospital in the last 2½ years. In 1899 Gebhardt states that about 6 per cent of all uterine cancers are body cancers. This agrees with the later observation of Thomas Wilson of London, in 1904.

I have carefully studied all the cases reported in the literature down to the present time, and I have failed to find one case reported showing a perforation like the one which I am now presenting. All the reports of such a condition give an account of a puncture being produced by a sound or curette in the malignant area, but none have a history of a sudden, severe hæmorrhage and a finding of a perforation previously existing — not a recent puncture.

The perforations or punctures, have all been

found or made at the site of the malignant area, while the one present in this case was two or three centimeters below the malignant part and must have existed for some time. That it was not a recent puncture was proven by the microscope showing that the edges were smooth, and not ragged as would have been the case if a curette had been thrust through the wall. No tissue seemed to be misplaced by the curette passing through the opening, except a small cluster of cells (tumor) found in the lumen of the perforation. These cells were evidently carried there from the fundus by the curette, but they were lying loose, and there were no other malignant cells found near this point.

Two centimeters or more above this point marked the beginning of the malignancy. There was no evidence of any cancer cells below this point; the carcinomatous area was wholly in the fundus. As stated above, many sections were made from the cervix, from the region of the perforation and from the opposite side; in fact, the whole uterus was cut up into small blocks of tissue from which many sections were made, but only the fundus was carcinomatous.

The region of the perforation was a mixture of involuntary muscle and degenerated connective tissue; it was a low type of tissue containing very few nuclei. The muscle fibers here seemed broken or irregular, and were intermingled with an apparently homogeneous tissue which contained very few nuclei, and when stained, gave the reaction of connective tissue. The blood vessels on the left side, not only between the layers of the broad ligament, but in the uterine wall as well, were congested and their walls were very much thickened. They were crowded close together, and probably exerted much pressure upon the adjacent tissue. Is it not probable that this pressure had something to do with the degenerated tissue in that area? The malignant cells were too far away to connect them with this degenerated area of perforation and hence we must look elsewhere for a cause. No other part of the uterus, outside of the malignant area, showed such low vitality. No other part of the uterus showed such a varicose condition and thickening of the blood vessels.

That the abnormal condition of the blood-vessels here had much to do with the degenerated tissue and the resultant perforation is my firm belief.

As to the carcinoma in the fundus the cause is unknown. But this much can be said, that since the fall of the patient more than five years ago, the uterus has, no doubt, on account of its disturbed circulation, proved a fruitful field for the growth and development of malignant cells, which the age of the patient only tended to augment. The lesion was evidently one of slow growth, having caused little change in the appearance of the endometrium.

The differential diagnosis of the malignant condition in the fundus is interesting and important, inasmuch as the reports of leading pathologists widely differed. The presence of the many giant cells, some of which showed their nuclei massed on one side, was evidence to one that the case was complicated with tuberculosis; the squamous-cell masses brought a diagnosis from another well-known pathologist that the lesion was a squamous-cell carcinoma of the fundus, metastatic from the cervix. Dr. Emil Reis was the first to point out the columnar-cell origin of the area and this diagnosis was confirmed by Dr. Hektoen.

Although this malignant area must be looked upon as an associated condition of the perforation, and not a cause — perhaps a result — yet its diagnosis and microscopical apects are of unusual importance and interest; for here we have to deal with a lesion which, I believe, we have been calling a metastatic squamous growth from the cervix, when in reality, it is a primary metaplastic growth of the fundus glands.

CONCLUSIONS

1. That an early diagnosis was not made from any symptom coming from the malignant area, but rather from the sudden hæmorrhage through the perforation is clearly apparent.

2. That metastasis does not occur so frequently from the carcinoma of the fundus uteri as from the cervix is markedly noticeable.

3. That malignant growths of the body of the uterus are of much slower growth and have much less pronounced symptoms than those

of the cervix is certainly proved by the cases reported.

4. That the diagnosis of early malignancy in the fundus uteri may be prevented because of the want of symptoms is evident.

5. That having made an early diagnosis we can, by complete extirpation of the uterus and adnexia, promise a very favorable prognosis.

BIBLIOGRAPHY[1]

ABEL, KARL. Ein Fall von circumscriptem Cervixcarcinom und gleichzeitigem isolirten Krebsknoten im Fundus uteri, Berliner Klinische Wochenschrift, 1889, vol. xxvi, p. 675.

ABEL, KARL AND LANDAN, THEODOR. Ueber das Gleichz. Vorkommen von Krebs am Halse u. Körper-uteri, Munchener med. Wochenschr., 1891, vol. xxxviii, p. 102.

ARAN. Du cancer de l'utérus, Gaz. d. hôp. Paris 1860, vol. xxxiii, p. 429.

ASTRUC. Traité des malad. des femmes, Paris, 1761–1765, vol. iii, p. 317.

BÄCKER, JOSEF. Ueber Aetiologie u. Therapie des Gebarmutterkribses. Archiv. f. Gyn., 1897, vol. liii, p. 47.

BÄCKER, JOSEF. Zwei Fälle von Carcinoma corporis uteri. Centralb. f. Gyn., 1904, vol. xxviii. p. 735.

BAISCH. Path. Anat. u Klin. Ergebuisse der operationen des Uterus Karzinomo Centralb. f. Gyn., 1905, vol. xxix, p. 329.

BALDY, J. M. AND WILLIAMS, H. L. Two cases of Primary Carcinoma of the Fundus uteri. American Jour. of Obstetrics, 1898. vol. xxxviii, p. 345.

BALDY, J. M. Uterine Cancer. Ann. Gyn. and Pediat., Phila., 1891–2, vol. v, p. 665: 1892–3, vol. vi. p. 395.

BAMALARI, S. Ann. sulle degenera scirrose e. cancerose dell'utero. Ann. univ. di Med. Milano, 1836, vol. lxxvii. p. 34.

BANGA. HENRY. Carcinoma of the Fundus of the Uterus. American Gyn. and Obstet., Jour., 1899, vol. xiv, p. 187.

BARNES, ROBERT. Cancer of the Uterus. Barnes, on Diseases of Women. 1874, p. 701.

BEYEA, H. D. Malignant adenoma of the corpus uteri. American Jour. of Obstet , 1896, vol. xxxiii, p. 196

BAYLE. Traité des malad cancerenses, Paris, 1834.

BENEKE. Neuere Arbeit. zur Lehre v. Carcinom, 1886–1891. Schmidt's Yahrbücher, vol. ccxxxiv, p. 73.

BERTHOLD, M. Primary Carcinoma of the body of the uterus, Ber. ü. d. Ereign in d. k. Gyn. Univ. Klin. zu Königsb., 1879. p. 68.

BEYEA. H D. Primary Carcinoma of the Corpus uteri. The Therapeutic Gazette, 1896, vol. xx, p. 512.

BIGELOW. Malignent dis. of the uterus. N. Eng. O. J. M and S., Bost., 1842–3, p. 251.

BINAUD, M. J. W. Un cas de Cancer primitif du Corps de l'utérus. Gazette Hebd. des Sciences Méd. de Bordeaux, 1894. vol. xv, p. 584.

BLAU. Einiges Path. Anat. über d. Gebärmutterkrebs Diss. Berlin, 1870.

BLONDEL, R. Cure radicale du Cancer du corps de l'utérus par la voie abdom. Cronica Med. Lima, 1898, p. 189.

BOARDMAN, W. E. A case of mag. dis. of the uterus, Boston Med. & Surg. Jour., 1883, vol. cix, p. 488.

BOIVIN ET DUGES, MME. Traité prat. des malad. de l'utérus, etc., Paris, 1833, vol. xi, p. 138.

BOISSIER, P. Cancer primitif du corps de l'utérus. Thèse. Montpellier, 1899.

BOLDT, H. J. Contribution to Lit. of cancer of the Uterus. Times and Reg. N. Y. and Phila., 1892, vol. xxiv, p. 455.

BONTEILLER. Obs. de cancer du corps. d. l'utérus, Union méd. de la Seine-In-Ronen, 1876, vol. xv, p. 17.

BOWREMAN. Carcinoma of the body of the uterus. The British Gyn. Jour., vol. xlix, p. 1.

BRENNER. Carcinoma uteri prolapsi. Wien, Klin. Wochenschr., 1891, p. 920.

BRESLAU. De totius uteri ex., Diss. Monach, 1852.

BYFORD, W. H. Carci. or Cancer of the Uterus. Syst. Pract. M. (Pepper), Phila., 1886, vol. iv. p. 274.

CALDERINI. Diagnostic et Traitement du cancer du corps de l'utérus. La Gynécologie, 1900, vol. v, p. 398.

CALDERINI, G. Du cancer du corps de l'uterus. Annales de Gyn., 1900, vol. liv, p. 186.

CAMERON. S. J. Carcinoma of the body of the uterus. The Lancet, London, 1905. vol. ii. p. 372.

CAMELOT, E. Cancer du corps de l'uterus. Soc. Anat. Paris, déc., 1897.

CHAMBERS, T. A case of Vegetating Epithelioma of the body of the uterus. The Obstet. Jour. of Great Britain and Ireland, 1873–4, vol. i. p. 552.

CHIARI. Klinik f. Gbtsh. u. Gyn. Erlangen, 1855.

CHROBAK. Fauslyrosses fibroid des Uterus Körpers Aertzl. Ber. d. Priv-Heilanst d. A. Eder., 1886, Wien., 1887, p. 132.

COE, SARAH J. Malignant dis. of the uterus. Tr Homoeop. M. Soc., Penn., 1892, Phila, 1893, p. 209.

CONDAMIN. D'une forme partie. de cancer uterine. Gaz. hebd. de méd. et de chir., vol. xlii, p. 32.

CORNIL. Leçons sur l'Anat Path. des Cancers de l'utéros Jour. des Conn. Méd., 1888.

COURTY, A. Cancer of the body of the Uterus. The Uterus, Ovaries and Fallopian Tubes, 1883, p. 700.

CRUVEILHIER. Anat., path., livr. 24, pl. 2; livr. 27, pl. 2; livr. 39, pl. 3.

CULLEN. THOMAS, STEVEN. Cases illustrating the various stages of adeno-carcinoma of the body of the uterus. Cancer of the uterus. Cullen, 1900, pp. 36, 408, 437 and 470.

CZEMPIN. Ein Carcinoma corporis uteri u. Carcinoma S. Romani. Berliner Klin. Wochenschr., 1894, vol. xxxi, p. 1204.

CZEMPIN. Ein Carcinom-corporis uteri mit gleickz. Carcinom des S. Romanum, Zeitschrif f. Geburtsh. u. Gyn., 1894–5, vol. xxxi. p. 445.

DANDOIS. Du cancer du corps utérin. Rev. Med. Louvain, 1894–5, vol. xiii. p. 193.

DEALE HENRY B. Sarcoma Fundi Uteri, American Jour. of Obstetr., 1895, vol. xxxi. p. 200.

DEMONS, A. Carcinome végetant du corps de l'utérus. Gazette Hebdomadaire des Sciences Méd. de Bordeaux, 1896, vol. xviii. p. 471.

DEMONS. Epithelioma du corps utérin., Jour. Méd. Bordeaux, 16 fév., 1896, p. 73

DESCOS. Cancer of the body of the uterus. Lyon Médical, 1899, vol. xci, p. 340.

DORLAND. W. A. NEWMAN. Coexistence of Carcinoma and Fibroma in the Corpus uteri, Philadelphia Med. Jour., 1901, vol. vii, p. 618.

DUNN, B. Vegetating epithelioma of the uterus. Tr. Maine M. Ass., Portland, 1881, vol. vii, pt. 2, p. 329.

[1] The literature and bibliography was compiled by Carl H. Von Klein, Chicago.

DUPARCQUE. Traité théor. et prat. des malad. organ. simples et cancereuses de l'utérus, Paris. 2 Ed., 1839.
ECKARDT, K. Zur Casuistik mehifacher mag. epithelialer Neubildungen am Uterus. Archiv. f. Gynocology, 1898, vol. lv. p 1.
EMANUEL, R. Ueber einen weiteren Fall von Hornkrebs des Uterus Körpero. Zeitschrift f. Geburtsh. u. Gyn., 1895, vol. xxxii, p. 477.
EMANUEL, R. Ueber Gleichz. Vorkommen von Carcinom u. Sarkom im Uterus Körpero. Zeitschrift f. Geburtsh. u Gyn., 1896, vol. xxxiv, p. 1.
EMANUEL, R. Ueber Gleichz. Vorkommen von Drüsenkrebs u. Hornkrebs im Uterus Körpers, etc. Zeitschrift f. Geburtsh. u. Gyn. 1901, vol. xlvi p. 434.
ENGDAHL, E. Cancer of the Uterus. Eira, Göteborg, 1879, vol. iii. p. 673.
ESMARCH, F. von. Ueber die Atiologie u. Diag. d. Carcinoma. Archiv. f. klin. Chir., 1889, vol. xxxix, p. 327.
FAST. Ueber das primäre Carcinom des cor. uteru. Diss. Inaug. Bul., 1895.
FERRUS. Cited by Köhler, Krebs u. Scheinkrebs erkrankungen Cited by Beyea in American Jour. of Obstetr., 1896, vol. xxxiii, p. 197.
FISCHER, EMIL. Zur Entstehungsweise secundärer Scheidenkrebse bei pri. Gebärmutterkrebse. Zeitschrift f. Geburtsh. u. Gyn., 1891, vol. xxi, p. 185
FLAISCHLEIN, NICHOLAUS. Ueber den primären Hornkrebs des Corpus uteri. Zeitschrift f. Geburtsh. u. Gyn., 1895, vol. xxxii, p. 347.
FOERSTER. Ein seltener Fall von Uteruskrebs. Berträge zur Geburtskunde u. Gyn. By F. W. von Scanzoni, 1858, vol. iii–iv, p. 31.
FORGET. Recherches clinques sur le cancer utérine. Gazette Med., 1851, p. 640.
FREUDENBERG. Ueber das primäre Carcinoma corporis uteri. Diss. Leipzig., 1896.
FÖRSTER. Scanzonis Beitr., 1860. vol., iv, p. 30.
FRIEDLÄNDER, C. Ueber Epithelwucherung u. Krebs. Strassburg, 1877.
FRIEDLÄNDER, C. Mikroskopische Technik. Cassel u. Berlin, 1882.
FRITSCH, HEINRICH. Carcinoma of the Uterus, The Diseases of Women. Fritsch, 1883, p. 249.
FRITSCH, HEINRICH. "The Carcinoma of the Body of the Uterus. Die Krankheiten du Franen, Fritsch, 1894, p 337.
FROMMEL, R. Carcinomen des Uterus körpers. Handbuch der Gyn. Veit., 1899, vol. iii, ii, i, p. 310.
GERHARD, CARL. Carcinomatous form of the body of the uterus, etc. Zeitschrift f. Geburth. u. Gyn., 1892, vol. xxiv. p. 1.
GELLHORN, GEORG. Zur Casuistik der Hornkrebse des Gebärmutter körpers. Zeitschrift f. Geburtsh. u. Gyn. 1897, vol. xxxvi, p. 430.
GESSNER, ADOLF. Ueber den Werth. u. die Technik des Probecurettements. Zeitschrift f. Geburtsh. u. Gyn., 1896, vol. xxxiv, p. 387.
GIRARD. Le cancer utérin. Marseilles Méd., 1884, vol. xxi, p. 272.
GODAERT. Cancer primitif du corps utérin. Bull. de la Soc. belge de gyn. et d'obst., 1895, p. 17.
GODART. Cancer du corps utérin. Soc. belge chir. Brux. 1899, p. 159.
GODSON C. Four cases of carcinoma uteri. Med. Press and Cir., London 1881. n. s., vol. xxxii, p. 6.
GOLDSCHMIDT. Carcinoma of the body of the uterus. Berlin B. z. Geb. u. Gyn., vol. iii. p. 120.
GOODELL, WILLIAM. Cancer of the Womb. Lessons in Gyn. Goodell, 1887, p. 285.
GREGORY, E. H. Cancer of the os uteri, St. Louis M. and S. J., 1880, vol. xxxviii, p. 166.
GUSSEROW, A. Ueber Carcinoma uteri. Samml. klin. Vortrag. Leipz., 1871, No. 18, Gyn. No. 6, p. 113.
GUSSEROW, A. Carcinoma des Uteruskörpers Stuttgart, 1886, p. 254.
GUSSEROW, A. Carcinom des Uteruskörpers, Handbuch der Franenkrankh. Billroth u. Luecke, 1886, vol. ii, p. 255.
GUTHMANN. Ueber d. Einfluss d. Erlichkeitauf Uteruscarcinom. etc. Inaug. Diss. Würtzburg., 1888.
HANDFIELD-JONES, M. Cancer of the body of the Uterus. Obstetrical Transactions, 1898, vol. xl, p. 34.
HANDFIELD-JONES, M. Cancer of the body of the uterus. The Lancet, London, 1898, vol. i, p. 1468.
HAUFF, VON. Zwei Fälle von Krebs in Uterus Med. Cor. bl. d. Würtlimb. aretzl. Ver. Stuttg., 1870, vol. xl, p. 212.
HERMANN, G. E. Early Diagnosis of Cancer of the Uterus. British Med. Jour., 1894, p. 1009.
HITSCHMANN, FRITZ. Ein Beitrag zur Kenntnis des Korpuskarzinoms. Centralb. f. Gyn., 1903, vol. xxvii, p. 1439.
HITSCHMANN, FRITZ. Ein Beitrag zur Kentniss des Corpuscarcinoms. Archiv. f. Gyn., 1903, vol. lxix, pp. 629 and 632.
HOFMEIER, M. Zur Diagnose des Carcinoma corporis uteri. Verhand. der deutsch. Gesell. f. Gyn., 1891, vol. iv, pp. 85 and 87.
HOFMEIER, M. Zur Statistik des Gebärmutterkrebses, etc., Zeitschrift f. Geburtsh. u. Gyn., 1884, vol. x, p. 269.
HOFMEIER, M. Zur Anat. u. Therapie des Carcinoma corporis uteri. Zeitschrift für Geburtsh. u. Gyn., 1895, vol. xxxii, p. 171.
HOFMEIER. Ueber Carcinoma Corporis uteri. Inaug. Diss. Würtsburg, 1899.
HORN, E. Bemerkuingen u. Beobac. u. den Krebs des uterus. N. Archiv. f. med. Efahr., Berlin, 1807, n. F. vol. iv, p. 9.
HUGNIER AND DEMARQUAY. La Gazette des Hôpitaux, 1861, p. 208.
ISEMER, FRANZ L. Zur Prognose der Radikal operation des Uterus-carcinoma. Zentralb. f. Gyn., 1905, vol. xxix, p. 123.
JACOBS. Cancer primitif du corps de l'utérus. Ann. de l'Inst. St. Anne et Semaine gyn., 1896, 8 oct., p. 358.
JANVRIN, J. E. Carcinoma of the uterine body. American Gyn. and Obstet. Jour.. 1896, vol. viii. p. 58.
JELKS. J S. Two cases of carcinoma of the uterus. J. M. Soc. Arkansas, Little Rock, 1890–91, vol. i, p. 349.
JESSETT, FRED. B. Cancer of the body of the Uterus. Provincial Med Jour., 1895, vol. xiv, p. 204.
JESSETT, FRED. B. I. Case of advanced uterine carcinoma II. Hæmorrhagic cyst of ovary with adeno-carcinoma of body. British Gyn. Jour.. 1896–7, vol. xii, p. 2.
JESSETT, FRED B Carcinoma of the body of the uterus. British Gyn. Jour , 1897–8. vol. xiii. p. 3.
JÖRDENS. Ueber den scirrhus u. das Carcinoma du inneren w. Geburtscheib. J. d. pract. Arzek u. Wundarzuk. Jena., 1800, vol ix, p 140.
JOSSELIN DE JONG. Ein Korpuskarzinom.· Centralb. f. Gyn , 1905, vol. xxix, p. 83.
KAUFMANN. Eine eigenartege. Form carcinomatöses Entartung des Endometrium corporis. Yahresb. der Schles. Gesellsch. f. vaterl. Cultur., 1894, vol lxxii. p. 52
KELLY. HOWARD A. Cancer of the body of the uterus Operative Gynecology, 1898. vol i. p. 490.
KELLY, HOWARD A. Abdominal Hysterectomy for Carcinoma and Sarcoma of the Uterus. Operative Gynecology, Kelly, 1898, vol. ii, p. 305

KERR, J. M. MUNRO. Carcinoma of the corpus uteri invading a myoma. Obstet. Transactions, London 1905, vol. xlvii, p. 191.
KIDD. Epithelioma of the uterus. Dubliu, S. J. M. Sc., 1873, vol. lv, p. 602.
KLOB, JULIUS M. Path. Anat. of the Female Sexual Organs, 1868, p. 191.
KÖHLER. Die Krebs u. Scheinkrebs kraukh., etc., Stutgart, 1853.
KORMANN. Fall eines primären Cylinder-zell carcimoms des corpus uteri. Archiv. f. Gynocology, 1874–5, vol. vii, p. 386.
KORMANN. Carcinoma of the body of the Uterus. Arch. f. Gyn., vol. vii, p. 386.
KRÄMER. Zur Ätiologie von Carcinom ins. des Uterus. Diss. Berlin, 1897.
KRUKENBERG, RICHARD. Die Resultate der operativeen Behandlung des Carcinoms u. Sarkoms der Gebärmutter etc. Zeitschrift f. Geburtsh. u. Gyn., 1892, vol. xxiii, p. 94.
LABERT. Traité prat. des. Malad. Carcinom., Paris, 1851, p. 219.
LANDERER, R. Ein Adeno-Carcinom des Corpus uteri. Zeitschrift f. Geburtsh. u. Gyn., 1892-3, vol. xxv, p. 45.
LANDAU, L. Case of Carcinoma of the body of the Uterus. Archiv. f. Gyn., 1893–4, vol. xlv, p. 159.
LAUDAU, L. Ueber den Gebärmutterskrebs Deutsche Med. Medicinalztg., 1887, u. Volksmann's Samonlung., 1889, No. 338.
LEBENSBAUM, MAX. Krebs der Vagina als Impfmetastase bei corpus-carcinom. Centralb. f. Gyn., 1893, vol. xvii, p. 112.
LEBERT. Traité des Maladies Cancereuses, 8vo. Paris, 1851, p. 217.
LEBERT. Malad. cancer., Paris, 1851, p. 212.
LEBERT. Traité prat. des Malad. carcinom. Paris, 1851, p. 219. Cited by Beyea, Amer. Jour. of Obstetr., 1896, vol. xxxiii, p. 197.
LEHMANN, FRANZ. Zur Kentniss der primären carcinome des Corpus uteri. Archiv. f. Gyn., 1900–1. vol. lxii, p. 439.
LEOPOLD, GERHARD. Carcinom u. Hydrometra des Corpus uteri in Verbindung mit linksertiger Ovarien-cyste, etc. Archiv. f. Gyn., 1875, vol. viii, p. 205.
LEOPOLD. Zur diagnose des Carcinoma corporis uteri. Verhandl. d. Deutschen Gesell. f. Gyn., 1894, vol. iv p. 108.
LEWERS, ARTHUR H. N. Primary cancer of the body of the uterus. Obstetrical Transactions, London, 1892. vol. xxxiv, p. 213.
LAUWERS. Des résultats defi. des opera. pour cancer. Presse med., belge, 1896, p. 48 and 217.
LAUWERS. Cancer du corps del utérus. Semaine gyn., Paris, 1898, p. 183.
LAUWERS. Du cancer du corps de l'utérus. Bull. de la Soc., belge de Gyn. et d' Obst., n. 10, p. 177. Carcinoma corporis uteri. Centralb. f. Gyn., 1898, vol. xxii, p. 482.
LAUWERS. Cancer du corps de l'utérus. Soc. Belge de gynéc., 1899.
LEWERS, ARTHUR. Uterus removed by abd. pan-hysterectomy for Primary Carcinoma of the Body." Obstet. Transactions, London, 1902, vol. xliv, p. 290.
LEWERS, ARTHUR H. N. Cancer of the Uterus. The Practitioner, 1902, vol. lxviii, p. 619.
LÖHLEIN, H. Carcinoma corporis uteri, kombinirt mit Fibro-myoma intramuraly. Centralb. f. Gyn; 1888, vol. xii, p. 487.
LÖHLEIN, H. Carcinoma corporis uteri beigleichz. Carcinoma beider Ovarien. Deutsche Med. Wochenschr, 1889, vol. xv, p. 502.
LÖHLEIN, H. Fall von adenomatöser Erkrankung des Corpus uteri mit multipler cystenbildung in der Corpuswand. Zeitschrift f. Geburtsh. u. Gyn., 1889, vol. xvii, p. 330.
LÖHLEIN. Zur Diag. u. Therapie des Gebärm. Gyn. Tagesfragen, Wiesbaden, 1891-93.
LOMER. Carcinoma of the body of the uterus. Centralb. f. Gyn., 1896, vol. xx, p. 169.
LOVERICH. Three cases of Malignant Disease of the body of the Uterus. Centralb. f. Gyn., 1898, vol. xxii, p. 83.
LUYS. Du micros. mémoire récompensé par l'Académie, 1856, méd. et dans "Traité de maladies de l'utérus," de Berqurel art. Cancer uterin, 1859.
MAILLAND. Cancer du corps thyroide. Emnucleation massive. Lyon Méd., 1900, vol. xciii, p. 234.
MANN. M. D. Carcinoma of the body of the uterus. Medical News, 1894, vol. lxiv, p. 455.
MALLETT, GEORGE H. Carcinoma of the body of the Uterus. New York Med. Jour., 1895, vol. lxii, p. 764.
MAUNSELL, R. C. B. Endothelioma of the fundus uteri. The Lancet, London, 1905, vol. ii, p. 224.
MAUTÉ, A. AND DANIEL CONSTANTIN. Cancer colloïde du corps utérin. Bulletins et Mémoires de la Soc. Anat. de Paris, 1904, vol. vi, p. 510.
MAUZONI, A. Ueber den Krebs des Uterus. Verona, 1811. Gionrale di medic. prat. compilato da Va. L. Brera, vol. i, Abth. ii, Heft. ii, Padua, 1812.
MARJOLIN. Cancer de l'uterus. Dict. de méd. 2 éd., Par., 1846, vol. xxx, p. 271.
MAYER, L. Verhandl. der Ges. f. Geburtsh. Monatschrift f. Geburtsh. Berlin, 1861, vol. xvii, p. 4.
MEISSNER. Franenzimmer Kronkheiten, vol. i, p. 955.
MENDENHALL, G. Carcinoma of the uterus. Cincin. Lancet and Obs., 1869, vol. xii, p. 110.
MERKLEN, PROSPER AND JACOMET, A. Un cas de cancer latent du corps de l'utérus. Bulletins de la Soc. Anat. de Paris, 1898, vol. xii, p. 180.
MONCEAUX. Du cancer isolé du corps de l'utérus, Gaz. d. hôp Par., 1856, vol. xxix, p. 458.
MONOD. Utérus dans le fond, etc. Bull, Soc. de chir. de Par., 1853–4, vol. iv, p. 483.
MONTGOMERY, W. F. Observations on the incipient stage of cancerous affections of the womb. Dublin Med. Jour., 1841–2, vol. xx, p. 433.
MORTIER. Cancer du corps utérin à forme polypense. Progrès Medical, 1906, vol. xxii, p. 83.
MORTIER. Polypöses Karzinom des corpus uteri. Centralb. f. Gyn., 1906, vol. xxx, p. 1413.
MÜLLER, EMIL. Diagnos. af. cancer corporis uteri. Hospitals-Titend, 4. R., vol. v, p. 941.
MÜLLER, O. Zur Lehre v. Carcinoma uteri. Charité-Annalen, vol. xviii, p. 527–549.
NIEBERGALL, E. Sarkom, Carcinom, Myom, u. Schleimpolypen an ein-u. demselben Uterus. Archiv. f. Gyn., 1895–4., vol. l, p. 129.
OERI, RUDOLPH. Ueber Epithelmetaplasie am uterus, besonders an Polypen. Zeitschr. f. Geburtsh. u. Gyn., 1906, vol. lvii, p. 384.
OFFERGELD. Ueber die Histologie d. Adeno-carcinome im Uterus fundus. Archiv. f. Gyn., 1906, vol. lxxviii, p. 289.
PAGET. The Morton lecture on Cancer, etc. British Med. Jour., November, 1897.
PAULY. Maladies de l'utérus, d'après les leçons clin. de M. Lisfranc, a l'hôp. de la pitié, Paris, 1837.
PAYNE. J. A case of cancer of the uterus. Memphis M. Recorder, 1856–7, vol. v, p. 395.
PENROSE, CHAS. B. Cancer of the body of the uterus. Text-book, Diseases of Women, Penrose, 1900, p. 214.

PEPPER, W. Primary cancer of the uterus. Proc. Path. Soc., Phila., 1866–70, 1871, vol. iii, p. 68.
PERELLI, C. I tumor maligni dell utero. Osservatore, Torino, 1876, vol. xii, pp. 609, 625, 664, 669, 705, 713, 769, 790.
PFANNENSTEIL, J. Doppeltem Carcinom an der Gebärmutter. Centralb. f. Gyn., 1893, vol. xvii, p. 414.
PHILLIPS, Carcinoma of the Uterus. Lancet, London, 1870, vol. ii, p. 568.
PICHOT. Etude clinique sur le cancer du corps et de la cavitie de l'utérus. Thèse de Paris, 1876.
PIERING, OSCAR. Ueber einen Fall von Atypischen Carcinom Bildung im uterus. Zeitschrift. f. Heilkunde, 1887, vol. iii, p. 335.
PISHOT, L. Etude Clinique sur le cancer du corps et de la cavite de l'utérus, Paris, 1876.
PLAYFAIR. Carcinoma of the body of the Uterus. Transactions of the Obstet. Soc., 1870, vol. xii, p. 116.
POZZI, A. Le Trait. du cancer de l'uter. Paris, Thesis, 1888.
POZZI, S. Cancer of the body of the Uterus. Medical and Surg. Gyn., Pozzi, vol. i, p. 396.
PROCHOWNICK. Ein Fall von Carcinoma corporisuteri. Centralb. f. Gyn., 1906, vol. xxx, p. 635.
RÉCAMIER. Recherches sur le traitement du cancer. Paris, 1819.
RECKLINGHAUSEN, VON. Proparat sined Krebses des Uterus. Monatschrift f. Geburtsh, 1862, vol. xx, p. 169.
REED. Primary Corporeal Carcinoma uteri. American Jour. of Obstetrics, 1896, vol. xxxiv, p. 706.
REICHEL, P. Ueber das Gleichz. Vorkommen von carcinoma des Uteruskörpers u. des Eierstockes. Zeitschrift f. Geburtsh. u. Gyn., 1888, vol. xv, p. 354.
RIES, EMIL. Eine neue Operationsmethode des Uterus carcinoms. Zeitschrift f Geburtsh. u. Gyn., 1895, vol. xxxii, p. 266.
RIES, EMIL. Ichthyosis Uteri. American Gyn. and Obst. Jour., 1896, vol. viii, p. 184.
ROUTH, AMAND. Malignant Disease of the Uterus. Medical Press & Circular, London, 1893, p. 529.
ROKITANSKI, VON. Carcinom des Gebörm. Körpers. Wien Med. Presse, 1877, vol. xviii, p. 146.
RUGE & VEIT. Der Krebs der gebörmutter Zutsch, der Gyn. u. Geburtskunde, 1881–2, vol. vii, p. 138.
RUGE, C. Ueber Adenoma uteri malignum. Zeitschrift f. Geburtsch. u. Gyn., 1894–5, vol. xxxi, p. 471.
RUSSEL, W. W. The Operative Significance of Metastases and P.-Operative Recurrences in Carcinoma of the Uterus. American Jour. of Obstet., 1896, vol. xxxiv, p. 851.
RUGE, PAUL. Double Carcinoma of the Uterus entirely separated from each other. Zeitschrift f. Geburtsch. u. Gyn., 1886, vol. xii, p. 202.
SALIN. Fall uf. malig. mybild. i. corpus uteri och högra mumma, Svenska Lökare Sellskapets. Förhandlung, 1892, p. 47.
SÄXINGER. Two cases of Carcinoma of the Fundus Uteri. Prager Med. Wochenschrift. 1864.
SÄXINGER. Carcinoma of the Body of the Uterus. Prager Viertely, 1867, vol. i, p. 118.
SCANZONI, F. W., VON. Österr Jahrb., 1846, Sept., Nov.
SCANZONI, F. W., VON. Frunbildunger innuhalb der Gebörmutter, Lehrb. der Krankh. der Weibl. Sexnalorgane. Wien, 1867.
SCHAUTA, F. Die Radicalbehandlung des carcinoma uteri. Zeitschrift f. Kielkunde., 1887, vol. viii, p. 324.
SCHMID, REGENSBURG. Statistik der Total-extirpationen per vag. bei Uteruscarcinom, 1887–1895. Inaug. Diss. Erlanger, 1894.
SCHMITT. Ueber Krebs des Uterus. Ges. obstetr. Schriften. Wien., 1820, vol. iii.
SCHÖNHEIMER, H. Zur Lehre vom Krebs des Gebärmutterkörpers. Archiv. f. Gyn., 1893–4, vol. xlv, p. 157.
SCHROEDER, C. Das Carcinom des Corpus uteri. Handb. der Krankh. der Weib. Geschlechtsorgan. C. Schrœder Leipzig, 1875, p. 279.
SCHROEDER, CARL. Das Carcinom des Corpus uteri. Krankheiten der Weiblichen Geschlechts-organe (Schrœder), 1887, p. 315.
SEELIG, ALFRED. Path. Anat. Untersuchungen über die Ausbreitungswege des Uterus-carcinomis, etc. Archiv. f. Path. Anat. u. Physiologie, Virchow, 1895.
SIEBOLD, E. Ueber den Gebärmutterkrebs. Berlin, 1824.
SIMPSON, JAMES Y. The Carcinoma of the body and fundus of the Uterus. Edinburg Med. Jour., 1863–4. vol. ix, p. 945.
SIMPSON, JAMES Y, SIR. Carcinoma of the body and fundus of the Uterus. Select Obst. Works, edited by James Block, 1871, vol. v, p. 768.
SIPPEL. Uerberimpfung des Carcinoma auf gesunde. Körpers Utlen d. E. Centralb. f. Gyn., vol. xviii, p. 88.
SKENE, A. J. C. Epith. of the Cavity of the Body Uterus. Am. J. Obst., N. Y., 1881, vol. xiv, p. 119.
SKENE, ALEX. J. C. Cancer of the Body of the Uterus. Diseases of Women, 1890, p. 417.
SMITH, PROTHEROE. Carcinoma of the Uterus. The Lancet, London, 1870, vol. ii, p. 568.
SMITH, PROTHEROE. Carcinoma of the Cavity of the Uterus. Transactions of the Obstet. Soc., 1870, vol. xii, p. 299.
SONDHEIMER, J. Primäres Corpuscarcinom mit Hæmatometra u. Hæmatokolpos bei Atresia vaginæ senilis. Monatschr. f. Geburtsh. u. Gyn., 1895. vol. i, p. 348.
SPENCER, HERBERT R. Carcinoma Sarcoma Uteri. The Lancet, London, 1905, vol. ii, p. 1109.
SPIEGELBERG. Ein Fall von primären u. isolistem carcinom des Gebörmutterkörpus. Archiv. f. Gyn., 1873–4, vol. vi, p. 123.
SPIEGELBERG. Primary and Isolated Cancer uteri, etc. British and Foreign Med. Chir., Review, 1874, vol. ii, p. 513.
STRATZ, C. H. Orer carcinoma uteri. Nederl. Tijdschr. v. Verlask, en. Gyn. Haarlem, 1892, vol. iv, 1–15, 2 pl.
STROBEL, Ein Fall von Carcinom des Uterusgrundes. Diss Erlangen, 1857.
SWAYNE, J. T. Case of Epithel. of the body of the uterus. Bristol. M. Chir. J., 1890, vol. viii, p. 119.
SWETT, J. A. An Essay on Cancer of the Uterus. N. Y. J. M. & S., 1839, vol. i, p. 34.
SZUKITS. Carcinoma of the b. of the Uterus. Zeitsch. d. Ges. d. Wiener Aertze, 1857, p. 414.
TANCHON. Recherches statistiques sur les malad. des femmes. Jour. des conn. méd., 1836, No. 2.
TESSON. Le cancer primitif du corps utérin. Thèse de Paris, 1902.
TESSON. Ueber das primäre Karzinom des Corpus uteri. Centralb. f. Gyn., 1903, vol. xxvii, s. 252.
TÉALLIER. Du cancer de la matrice. Paris, 1836.
THOMAN, E. Uterus Infarct. und initiales Carcino. dor Gebärm, in Klinn. Bilde. Allg. Wien. Med. Ztg., 1890, vol. xxxv, p. 62.
THOMAS, T. G. Cancer of the body of the uterus. Am. J. Obst., N. Y., 1872–3, vol. v, p. 762.
THOMAS, GAILLARD T. Part of uterus affected. Diseases of Women, 1880, p. 589.
THORN, J. Zur Kasuistik, der Uterussteine. Zeitschrift. f. Geburtsh. u. Gyn., 1894, vol. xxviii, p. 75.

THOMSEN, CHRISTIAN OTTO. Gleichz. Vorkommen von Karzinom des Uterus Körpers u. der Portio Vag. Zentralb. f. Gyn., 1905, vol. xxix, p. 123.
TULPIUS. NICOLAUS. Observationes Medicæ. Ed. Nova, Amstelodami, 1672, p. 292.
ULLMANN, C. Cancer Uteri. Gebärhent, Encycl. Wörterb. d. Med. Wissenschr. Berl., 1831, vol. vi, p. 626.
VALET, P. De l'épithélioma primitif du corps de l'utérus. Paris, 1888.
VEIT, J. Ueber einen Fall von Carcinoma des Uterus Körpers. Zeitschrift f. Geburtsch. u. Gyn., 1877, vol. i, p. 467.
VEIT, J. Ueber Carcinom des Uteruskörpers. Deutsch Med. Wochenschift., 1883, vol. ix, p. 4.
VEIT. Präparate von Krebs des Uteruskörpers. Zeitschr. f. Geburtsh. u. Gyn., 1886, vol xii, p. 455.
VEIT, J. Carcinom des Uteruskörpers. Handbuch der Gynäkologie, Veit, 1897, vol. i, p. 370.
VEIT, J. Carcinoma Corporis uteri. Centralb. f. Gyn., 1897, vol. xxi, p. 910.
VELPEAU. Nouveaux éléments de médicine opératoire. Paris, 1832.
VILMAR. Ueber Carcinom Corporis uteri. Diss. Strasbourg, 1894.
VITRAC, JR. Deux hysterectomies vagino-abd. Pour épithélioma primitif du Corps de l'utérus. Gazette Hebdomadaire des Sciences Médicales de Bordeaux, 1897, vol. xviii, p. 247.
VOLKMANN. Ueber den premären Krebs, etc. Klin. Vortr., 1889, p. 334.
WAGNER, W. Fibromyom u. Carcinoma des Corpus uteri. Deutsche Med. Wochenschr., 1886, vol. xxii, p. 501.
WALSHE. Nature and Treatment of Cancer, London, 1846.
WAGNER. Der Gebarmütterkrebs. Leipzig, 1858, p. 122.
WEHMER. Ueber gleich. Vork. bösartg. Geschn. des Uterus u. Ovariums. Diss Inaug, Würzburg. 1894.
WEIL. Case of Carcinoma Corpus uteri. Prager Med. Wochenschrift, 1896, vol. xxi, p. 258.
WEISS. Quelques considérations sur le cancer du corps utérin. Rev. Méd. de l'est, Nancy, 1892, p. 744.
WEISS. Quelques considèrations sur le cancer du corps utérin. Revue. Méd. de l'est Nancy, 1892, vol. xxiv, p. 744–757. Also: Arch. de Tocol. et de Gyn. Par., 1893, vol. xx, p. 528.
WEISS,M. Quelques Considerations sur le Cancer du Corps Utérin. Archives de Tocologie, 1893, vol. xx, p. 528.
WENZEL. Krankh. du Gebärmutter, Mainz., 1816, vol. i, p. 6.
WEST, CHARLES. Diseases of Women, 1858, p. 264.
WILLIAMS, JOHN. Cancer of the Uterus; Harveian Lectures for 1886, London, 1888, p. 119.
WILLIAMS, W. ROGER. On the Morphology of Uterine Cancer. British Gyn. Jour., 1895–6, vol. xi, p. 529.
WILLIGH. Prager Viertelyahrssch., 1853, vol. ii, p. 4.
WILSON, THOMAS. Cancer of the body of the Uterus. Journal of Obstet. u. Gyn. of the British Empire, 1904, vol. vi, p. 261.
VINEBERG. HIRAM N. Case of Carcinoma of the body of the Uterus. American Gyn. and Obstet. Jour., 1897, vol. x, p. 464.
WINTER. Ueber de Ursache der. Krebs. Zeitschr. f. Geburtsh. u. Gyn., Stuttg, 1892, vol. xxiv, p. 144.
WINTER. Ueber die Recidive des Uteruskrebses, etc. Zeitshcrift f. Geburtsh, u. Gyn., 1893, vol. xxvii, p 101.
WINTER. Carcinoma corporis uteri. Zeitschrift f. Geburtsh, u. Gyn., 1894, vol. xxx, p. 285.
WINTER, G. Carcinoma Corporis. Handbuch der Gyn. Veit, 1899, vol. iii, ii, i, p. 234.
WOODHULL, A. W. Case of cancer of the uterus. Trans. Med. Soc., Newark, N. J., 1870, p. 147
ZABOLOTSKY, A. Cancer à cellules plates du corps de l'utérus. Nouvelles Arch. d Obstétrique et de Gyn., 1895, vol. x, p. 10.
ZABOLOTSKI, A. P. Un cas d' épithélioma pavimenteux de l'utérus. Annales de Gynécologie, 1895, vol. xliii, p. 259.
ZELLER. A. Plattenepithel im Utérus. (Psoriasis uterina). Zeitschrift. f. Geburtsh, u. Gyn., 1884–5. vol. xi, p. 56.
ZEROWSKI, B. M. Ueber das oberflächliche Carcinom des Corpers. Berlin, 1903, L. Schumacher, pp.

IMMEDIATE VS. DEFERRED OPERATION FOR INTRAABDOMINAL HÆMORRHAGE DUE TO TUBAL PREGNANCY[1]

By FLORIAN KRUG, M. D., New York

IN accepting the request of the Council to open the discussion on this most important question, I realize not only the great honor bestowed upon me, but also the grave responsibility thereby involved. The Council in its preliminary circular expressed the hope that those writing papers on the subject should not take too strong a partisan view, unless conviction inspired it in the interest of the patient. This injunction is eminently proper, when we consider that while our remarks are made before a jury of peers ready to cope with any emergency, they are bound to reach the busy general practitioner and will formulate for him a standard of rules, which may have to guide him perhaps in the middle of the night, more or less unprepared, with a human life and the happiness of an entire family at stake.

Based on a large and varied experience, I shall endeavor to convey my thoughts to you *sine ira et studio*, free from any theoretical base.

To the younger men it must sound strange nowadays that not so very many years ago whether ectopic gestation, ruptured or unruptured, might be a surgical disease, was at all debatable. Still fresh in my memory are the animated tilts I had with men then high in authority, who condemned operative procedure and advocated injecting morphine into the fœtal sac, or, recommended to turn on various electric currents, with the view to destroy the fœtal life, as though all danger to the patient would pass after the electrocution of the ectopic fœtus.

Even the propriety of recording specimens of tubal abortion or rupture as cases of ectopic gestation was disputed in the absence of a well-developed fœtus, and the time-honored name hæmatosalpinx was substituted.

Fortunately, those times have passed. The symptomatology and pathology of ectopic pregnancy have been well studied and accurately described. Surgical interference is the universally and solely recognized therapeutic measure, notwithstanding the few sporadic cases which recover without it.

In fact so strongly swung the pendulum in favor of early surgical interference, that undue haste was charged against some of its adherents and a decided reaction set in, in the minds of some, as witnessed in last year's session of our society and a number of subsequent essays. That the pendulum took too far an excursion to the other side, there is no doubt in my mind. But I cannot but admire the courage of those who took that stand against a popular conviction and were willing to be subjected to most adverse criticism.

When, then, shall we operate? No doubt exists as to the proper time in unruptured cases. The sooner the better, is the watchword, although no one would think of operating in the middle of the night, or without proper preparation of the patient and her surroundings, including ourselves and assistants.

Diversity of opinion commences to exist after rupture has taken place. Still the large majority will readily agree that, if the first symptoms of rupture, or of tubal abortion are recognized, involving usually but a moderate degree of internal hæmorrhage or shock, operation is called for the same way as in unruptured cases, viz., as soon as proper conditions and surroundings for an aseptic performance of a laparotomy can be procured, unnecessary delay to be as much avoided as undue haste.

We really commence to enter disputed ground, when we are confronted with the cases that are in immediate danger and exhibit the symptoms of shock and acute hæmorrhage. Much anxiety on our part, and also much unnecessary discussion could be saved, were we always able to distinguish satisfactorily between shock and hæmorrhage. The physical signs of both being so much alike, it is often well nigh impossible even for the most exper-

[1] Read before the American Gynecological Society, Philadelphia, May 26, 1908.

ienced one to determine beyond a reasonable doubt, where the greater danger for the patient lies, and to steer her clear of Scylla as well as Charybdis.

It will always be impossible to lay down strict rules applicable to each and every case. We must individualize and also be guided by extraneous circumstances as to the place and surroundings of the patient. It has forcibly struck me that, in all previous discussions on this subject, the important factor of traumatism has not been sufficiently taken into consideration, this being responsible for unnecessary argumentation. By eliminating the cases where trauma superinduces acute hæmorrhage and where the ectopic gestation is only a contributive condition, we will save much time and confusion.

For instance, in all cases where the ectopic gestation has been overlooked, and dilatation and curettage for a supposed incomplete abortion was performed causing foudroyant internal hæmorrhage, it stands to reason that we must at once try to correct our mistake by opening the abdominal cavity to repair the damage done. It is self-evident that traction on the uterus by means of a bullet forceps while the necessary dilatation preceding a curettage is done, may cause a big rent in the fœtal sac, and involve blood-vessels much larger and more frequently of arterial type than an ordinary rupture or tubal abortion will ever present. Too vigorous bimanual palpation and other injuries may also be cited as causative in this respect. The surgical axiom of at once tying the bleeding vessel or vessels holds indisputably good here as well as in other traumatic lesions accompanied by internal hæmorrhage. However, this should not prejudice our actions in cases uncomplicated by trauma.

It is my firm conviction and belief, based on a very large experience with all kinds of ectopic conditions, that the first onset of rupture or tubal abortion is seldom if ever accompanied by an amount of bleeding which in itself would be dangerous to the woman's life. Fortunately for the patient prodromal symptoms, such as excruciating colicky pains, are often the first danger signals causing the woman to seek medical advice.

Right here lies the root of all possible evil as well as the ultimate salvation of the patient. Should she complain to a man who will be satisfied to prescribe a narcotic for her, she will remain ignorant of the threatening danger, until it may be too late. On the other hand should she consult a physician, who, after listening to her story, would at least suspect ectopic gestation and if still in doubt after his examination would at once refer her to the gynecologist, all would be well.

In the last years the state of affairs in New York has taken a most favorable aspect in this regard. The intelligent and well-to-do will apply early to the specialist, or will be referred to him by the family physician. The poorer classes have just as good a chance, as the many modern dispensaries and hospitals furnish them early advice and surgical help. Ignorance and prejudice against surgical operations are rapidly dying out among the masses. As a result of these conditions, the total number of laparotomies for ectopic gestation is constantly on the increase in most of our institutions, while the proportion of neglected cases to the early diagnosed ones is steadily becoming smaller.

Still there remains a certain percentage of cases where, after a more or less prolonged period when no need was paid to prodromal symptoms, severe and alarming attacks demand our services at once.

Most of these cases are brought to the hospital by the ambulance service, and the question of immediate or deferred operation becomes essential.

In former years it was my iron-bound rule not to lose a minute, but in all cases hurriedly to open the abdomen, irrespective of any other considerations. The results were good, but not entirely to my satisfaction. It would happen that I could not be reached quickly and that, in the absence of another surgeon, an inexperienced house-surgeon would have to perform most difficult work in the middle of the night, tired from a hard day's work of assisting in the operating room, with a tired staff of assistants and nurses. Again, I would arrive at the hospital shortly after the patient had been brought in, find her in deep collapse, would at once proceed with the oper-

ation, only to find on opening the abdomen, that the hæmorrhage had ceased, and that the total amount of blood lost was small, at any rate not sufficient to have caused such profound collapse.

I could not help asking myself, when after a rapidly and may I venture to say brilliantly performed laparotomy, when all hands were kept busy reviving the patient from shock, what would have been the patient's fate if a less experienced and slower operator had performed the operation, under less favorable surroundings than a perfectly appointed, modern operating room? Again, when I had the patient out of immediate danger, if suppuration in the abdominal wound, due to imperfect preparation of the patient, or incomplete asepsis during the hurried performance of the work, would prolong the recovery, I would ask myself would it not have been better to have waited till the following morning? Slowly but surely I came to the conclusion that the greater safety for the patient did not lie in a post-haste operation, but, with rare exceptions, in allowing her a reasonable time to recover from shock, while prepared to go ahead at short notice should any sign of recurrent hæmorrhage appear. Not a single life has been lost from hæmorrhage or shock since I adopted that rule and I believe that it can safely be assumed that some have been spared, who otherwise would have succumbed.

To be brief (I will not go into extensive statistics) suffice it to state that, since the opening of the new Mt. Sinai Hospital until the present day, a period of four years, nearly one hundred cases of ectopic gestation have been admitted to my service. All, with the exception of one, who went home against my advice, were operated with but two deaths, one resulting from etherpneumonia, and the other from a septic condition, existing prior to admission. None died from hæmorrhage or shock.

The time allowed to elapse between admission and operation varied from several hours to four days, the average time being two days. In cases of profound collapse, morphine was given hypodermically, heat applied to the body, and the foot of the bed raised. No intravenous infusion was ever given until after the operation was nearly completed. Bimanual examination was always made in a most careful way.

If, within half an hour after the admission of a patient to the hospital in collapse her pulse showed marked improvement, it was assumed that active hæmorrhage had stopped and efforts to overcome the shock were continued with, while her pulse was taken every fifteen minutes up to the time of operation. Let me repeat here that in a number of cases the amount of blood found in the abdominal cavity was by no means proportionate to the severity of the shock. The statement to the contrary is arbitrary, and, in the light of my experience, erroneous.

I mentioned before, that the longest time allowed to elapse between admission and operation was four days. I want to qualify this statement, by adding, that in none of these cases was it actually deemed necessary to wait that long before operation was resorted to. However, these cases had all recuperated so nicely from the shock on the second day, that I felt justified not to interfere with the routine work of the institution, and deferred operating them until my next regular operating day. In the meantime they were kept under strict surveillance.

Never in all my experience have I met with a single case where I would consider it justifiable to defer the operation longer than a few days. Certainly not in a medical center, where a nearby hospital can easily be reached by ambulance, or where even in the most squalid quarters aseptic conditions and proper assistance may be obtained at short notice.

Up to the present time, I have strictly adhered to my purpose to give my personal views only as far as they are sustained by my own experience. However, I feel it my duty to venture further and state what I deem advisable for the country practitioner to do when suddenly confronted with a case of ruptured ectopic gestation. If he has some surgical training, and feels confident that he can accomplish the work, by all means let him do it.

He can easily get his kit of tools ready, a scalpel, a pair of scissors, a few hæmostatic forceps, a needle, some sterile tying and sut-

uring material, and a pair of sterile rubber gloves are all he needs.

Let him remember, however, that while he is busy getting things ready, efforts should be made to overcome the shock of the patient. By the time the water has been boiled and other necessary preparations completed, say in twenty or thirty minutes, should he find the patient to be in a decidedly better condition, don't let him be hasty. He has won the first skirmish; let him gird his belt a little tighter, summon his reserve forces and he will then be in a still better position to triumph over menacing death.

Should he feel that the task is too much for him, *then and only then*, let him carry out the temporizing instructions of the gentlemen who had the courage to demonstrate to us that cases may be kept alive in a hibernating state not only for days, but for weeks, at any rate long enough until competent surgical help can be summoned.

I am now coming to the close of my paper. Our highest aim in all branches of medicine and surgery should be prophylaxis. Since we can never hope to prevent ectopic conception, we must strive for the next best, viz., early diagnosis followed by early surgical cure of this most treacherous disease of woman. We must not be satisfied to do the right thing ourselves; no, gentlemen, our campaign must be an educational one including not only the medical student and the general practitioner, but also the masses.

When the majority of women commence to realize the early prodromal symptoms of ectopic gestation and are familiar with the perfect results of early surgical interference, we can feel that we have fulfilled a great and glorious mission.

PUERPERAL SALPINGITIS

By L. V. FRIEDMAN, M. D., Boston, Massachusetts
Assistant in Obstetrics and Gynecology, Harvard University

IT is my desire to call attention to a complication of the puerperium which is very common, but not usually differentiated from uterine sepsis. This is to be described as the subacute exacerbation, during the puerperium, of an old inflammation of the Fallopian tube. This "puerperal salpingitis" is to be distinguished from the acute salpingitis, which is an early or late sequel of uterine infection at the time of labor. The latter has been described frequently, but of the former, which I term "puerperal salpingitis," I have not been able to find any adequate description. In the past three years I have seen twenty-one cases in which the symptoms and course were strikingly similar. In consequence, the affection is not to be considered rare.

Etiologically considered, there are two forms: that due originally to a gonococcus infection, and that due to any of the other organisms which cause salpingitis. The gonorrheal form may appear some years after a typical acute infection, or it may be a sequel of an infection of so mild a character as to have attracted but little attention when it occurred. The second form, which may be called "septic" to distinguish it from the gonorrheal, is due to previous tubal infection by the streptococcus, staphylococcus, colon bacillus or other organism at the time of an abortion, miscarriage or labor. I have not been able to differentiate the two forms clinically.

The onset is acute and usually occurs on or after the third day. A number of the cases seen showed no symptoms until the fifth day. In one instance pus was detected in the lochia thirty hours after delivery. There is no chill but the temperature rises rapidly from normal to 102°-103° F. The pulse does not rise in proportion to the temperature, which is significant of the generally good prognosis. The patient complains of pain in the pelvis on the side affected, and frequently lies flat on the back with the leg drawn up on that side.

Tenderness is elicited on deep abdominal pressure but is usually much less than the temperature and pain would lead one to expect. Spasm is usually absent. Vaginal examination is not of advantage because the inflamed tube lies high in the pelvis or even in the abdomen, maintained in this position by the uterus, which has not yet undergone involution. The lochia, at the onset, are usually normal in color, odor and amount, but within twenty-four hours pus is present.

Pain may be absent or so slight that the patient does not complain of it. The amount of pain and the mildness or severity of the various symptoms depend upon the existing facilities for draining the tube. In consequence there are three well-founded types:

1. Where the tube is closed at its peritoneal extremity but open into the uterus, the temperature and pain are moderate or absent, but the lochia are contaminated by pus soon after delivery.

2. Where both peritoneal and uterine ends of the tube are occluded the temperature is high, the pain severe and constant, but the lochia normal. In this second type the tube may threaten to rupture into the peritoneal cavity, but I have never seen this grave sequel because when the pressure of pus becomes high it is usually forced into the uterus.

3. Where the uterine extremity of the tube is closed and the peritoneal end open the lochia are normal, but the temperature is high and there are present symptoms of beginning peritonitis from the escape of pus into the peritoneal cavity.

I have never seen an instance where both ends of the tube were open.

When the symptoms are well marked the diagnosis is obvious. But generally the pain and tenderness are so slight as to be deceptive. The differential diagnosis is sharp and interesting. The history of a previous attack of salpingitis is suggestive. Where the symptoms arise early in the puerperium, that is, on or before the third day, we are inclined to think first of uterine infection, but the patient does not appear seriously sick; the pulse is not so rapid in relation to the temperature as it is in uterine sepsis. The area of tenderness, if carefully outlined, will be found on one (or both) sides of the uterus rather than on the fundus itself; the lochia are not usually foul or scanty; moreover, the onset is much more acute. It is my firm conviction that in uterine sepsis, although the symptoms may not reach an alarming point until the third day, they are to be found by the acute observer within forty-eight hours of the delivery, and not infrequently within thirty-six hours. This difference in diagnosis is of crucial import because early intrauterine instrumentation, which is so necessary in uterine sepsis, is a useless and even dangerous procedure in salpingitis.

If the right side be affected, appendicitis must be ruled out. This is done with difficulty because the tube at this period approaches closely the normal position of the appendix. Particularly in the second type does the condition resemble an acute appendiceal attack, but in puerperal salpingitis the temperature is apt to be higher and there is usually no vomiting and spasm. It is well to bear in mind also the possible constriction of a fibroid and an ascending ureteral infection or pyelitis.

So far as my experience goes the prognosis is invariably good in puerperal salpingitis. Even in the two severe cases which I have seen where high temperature, rapid pulse, exquisite pain and a palpable mass were present and where, for two days, I was constantly in readiness to open the abdomen, resolution occurred without treatment. As a rule the temperature and pain disappear within forty-eight hours of the onset, but the tenderness is more persistent and in consequence the puerperal convalescence is lengthened somewhat. The moderate attacks do not necessarily entail future sterility. Where the affection becomes progressively worse and the peritoneum is threatened, the abdominal removal of the tube becomes necessary. Usually the course is so short that it is merely necessary to direct treatment to the relief of symptoms for the patient's comfort. Except where definitely indicated, stimulation is to be avoided. The patient should have absolute rest. Moderate doses of codeia (gr. ½ every four hours) give comfort without masking serious symptoms. The ice bag or coil over the tender area usually relieves the pain. Moderate saline catharsis lessens the headache and other symptoms of absorp-

tion. The attack is seldom so prolonged as to require the abandonment of nursing. I add brief descriptions of two cases.

CASE I. Mrs. W., age 30, German. First labor in 1900 terminated by difficult forceps operation. In 1902 an abortion at the fourth month followed by fever and pain in pelvis. Present delivery May 14, 1906. Difficult high forceps.

There were no symptoms until the evening of the fourth day when patient complained of sharp pain and tenderness in lower left quadrant. T. 100.2°, P. 90. The following evening T. 102.8°, P. 112. Pain constant and severe, lochia absolutely normal. On the morning of the sixth day patient cheerful, without pain, tenderness much diminished, room full of foul odor from pus which replaced lochia. The temperature and pulse were practically normal. There was a moderate rise of temperature on the seventh day, probably due to absorption from the uterine surface. The convalescence then proceeded without interruption. Four weeks later final examination showed a normal pelvis except for a thickened tube on the left. This was the size of my thumb and slightly tender.

CASE II. Mrs. McK, age 24, English. History negative. First labor, 1908, normal delivery. Thirty hours after delivery lochia replaced by free discharge of foul pus. For several days thereafter T. 100° to 101.5°, P. 72 to 84. Slight tenderness on deep pressure to right of uterus. On fifth day temperature fell to normal and convalescence proceeded without interruption.

In neither of the above cases was it found necessary to institute any local treatment.

A SHORT NOTE ON THE DELIVERY OF THE FŒTAL HEAD AFTER DECAPITATION

BY J. C. HOLDICH LEICESTER, M. D., B. S., B. Sc., M. R. C. P. (LOND.), F. R. C. S. (ENG.)
Indian Medical Service, First Surgeon to the Presidency General Hospital, Calcutta, India.

Those who have had occasion to deliver the head of the fœtus after decapitation must often have found some difficulty in the extraction in those cases where the pelvis is contracted to such an extent, or the head so large or so ossified, that delivery cannot be effected without the aid of forceps, or even in more extreme cases by perforation and the application of the cephalotribe.

In these cases the head is apt to slip about the uterine cavity and to cause considerable delay before a firm grip can be obtained of it. Various methods of fixation have been suggested, but none appeared to me to be entirely satisfactory when put to the test of practice. The method which I adopted during the time that I was resident surgeon to the Eden Hospital for Women, Calcutta, and which I was able to put to practical test, was to fix the head by means of the blunt hook passed as far back as possible into the mouth of the fœtus. If an assistant now makes traction on this it will be found to fix the head securely and to render the application of forceps, or even perforation and the application of the cephalotribe quite as easy as in the delivery of the after-coming head in a breech presentation. I have used this simple manœuvre in some ten cases and I have not known it to fail.

Having found it so useful in my own work and never having seen it described, I have thought it worth while to place this short note on record for the benefit of those to whom it may not have occurred.

DEPARTMENT OF TECHNIQUE

A CASE OF VESICOVESTIBULAR FISTULA INVOLVING THE WHOLE URETHRA. OPERATION. IMPROVEMENT[1]

By WILLIAM W. ASHHURST, M. D., Chihuahua, Mexico

On July 26, 1907, Mrs. A. R. S. was brought to Chihuahua by Dr. R. Nichol of Ciudad Guerrero, with a history of having had her first confinement about a month previously. She was assisted in it by an inexperienced physician, who applied forceps, as Dr. Nichol believes, upside down, i. e., with the convexity of the blades upward. The natural result was extensive sloughing of the urethroclitoric region. Her condition when I first saw her was as follows: A large vesical fistula occupying the anterior part of the vestibulum, reaching from the introitus vaginæ to beyond the region of the meatus urinarius, the urethra having sloughed away in its entirety. The fistula was about four centimeters in its sagittal, and three and one-half centimeters in its transverse diameter. The superior vesical wall was protruding through this opening, having something the appearance of a mucoid polyp. Cicatrization of the denuded tissues was complete, the sloughing having involved the base of the clitoris and the left side of the prepuce, so that the remains of the clitoris were visible, attached to what seemed the right labium minor, being drawn forward and to the right from its normal position. As was to be expected, cystitis was present, but otherwise the patient was in fair condition. There was a rather deep laceration of the left side of the cervix uteri.

In the complete absence of every portion of the urethra, the question arose as to what operative procedure could give the patient relief. Dr. Francisco Armendariz being called in consultation, Dr. Nichol and I discussed the matter with him. Obviously a fistulous opening must be left for the escape of urine, and rather than have this fistulous opening near the vagina, we decided to make a suprapubic fistula, and attempt to close entirely the opening below the pubis, believing that the suprapubic opening would be far preferable to one near the vagina, permitting, as we hoped it would, voluntary retention of urine and voluntary micturition, as in the case of inoperable prostatic hypertrophy. It would also have the advantage of keeping the urine from the vagina, which in case of future pregnancy would be of great importance. And finally it would be far preferable to closure of the vagina, in that it would permit the patient to perform her marital functions, and would be free from the many objectionable features of this old operation.

Dr. Armendariz, as an experienced gynecological operator, was charged with the operative treatment of the case. At the first operation I was out of town, but will give the results as I saw them afterward. It consisted of making the suprapubic opening and attempting to close the fistula. The first step was entirely successful and satisfactory, but the attempted closure of the fistula was a partial failure owing to sloughing. However, rather to our surprise, what at first looked like an entire failure proved to have benefited the patient considerably, for after the stitches had sloughed out, the opening began to contract, and by the end of September had shrunk to about two and one-half by two centimeters. On September 27th, a second attempt was made to close the fistula. This was in all essentials similar to the first: Sloughing of the stitches, followed by further contraction of the opening, so by October 11th it was reduced to about one and one-half by two centimeters, when a third attempt was made, followed as before by sloughing of the stitches and afterward by further contraction of the opening, so that by October 31st the fistula measured about four fifths of a centimeter in diameter in both directions. At this time the patient at night wore a tube attached to the suprapubic cannula, draining the urine into a bottle. Under these circumstances not a drop escaped subpubically. During the day she wore a rubber urinal suspended from the waist and at rather frequent intervals emptied the bladder through the suprapubic cannula. The bladder would hold a small quantity of urine (one and one-half or two ounces) without its escaping through the subpubic fistula, unless the patient stooped over or made some exertion, when it would escape into the urinal. At this time she had been up and about for some days, and left Chihuahua for her home, to return later

[1] Read before the International Medical Association of Mexico, January 25, 1908.

for a further operation, in case the fistula did not close spontaneously, which seemed not altogether unlikely in view of the marked tendency to contract that it had already manifested.

This tendency to contract, it seems to me, must have been due to the almost constant suprapubic drainage. The sloughing out of the sutures I attribute not to faulty technique, but to the state of the tissues surrounding the fistula, which on account of previous extensive sloughing were drawn tense, so that approximation of the edges was unusually difficult.

The remaining small subpubic fistula occupies the site of the most anterior portion of the fistula as it originally existed.

In case it does not close spontaneously or after stimulating its edges by cauterization, I would suggest drawing down the anterior wall of the bladder, denuding a small area, and suturing it in the opening, to plug it, as the iris plugs a corneal perforation.

Dr. Nichol writes me from the patient's home as follows, under date of January 15, 1908:

"The fistula has not closed but it is decidedly smaller. The flap which you made, forming a kind of artificial 'vestibulum,' is in good condition, and covers the remaining fistula. The woman is perfectly comfortable. At night she puts in her suprapubic drainage tube and so sleeps perfectly dry. Sometimes the drainage tube slips out when she turns around in bed, but even then she does not wet herself, as in the horizontal position the fistula is tilted up and does not leak until there is considerable urine in the bladder."

The flap referred to was formed by denuding and uniting the edges of the remains of the labia minora in order to lessen the tension on the edges of the fistula.

REPORT OF A CASE OF HERNIA OF THE OVARY, ACCOMPANIED BY STRANGULATION, IN A CHILD FIVE MONTHS OLD

By JAMES F. CHURCHILL, M. D., Chicago

Dorothy K. — aged 5 months. Admitted to Dr. Besley's service at Charity Hospital 7-27-08. The following history was obtained:

Delivery was normal. The child was breast-fed until about two months of age, when the mother's milk diminished to such an extent that the child was taken from the breast and fed on modified cow's milk. Since that time the child has not been well and has become somewhat emaciated.

When the child was about 2 weeks old the mother noticed a small mass in the left inguinal region. This was about the size of a pea, soft and easily reducible. At about 6 weeks of age the mass became larger and much harder but was reducible.

A few days before admission to the hospital the child was brought to the pediatric clinic at the Post-Graduate Hospital for feeding. Patient was seen by Dr. Silverthorn, who on July 25 referred the case to the surgical clinic for examination. At this time a probable diagnosis of inguinal ovarian hernia was made, but as the hernial mass was easily reducible operation was deemed unnecessary and advised against.

On Monday evening, July 27, the child was brought into the Charity Hospital, the mother stating that the mass had suddenly become hard and irreducible 24 hours before. The child had vomited twice during the day and a bowel movement could not be obtained. The child appeared to be in very much pain. A firm mass about the size of a hickory nut was found over the right external inguinal ring.

The mass was irreducible and apparently very tender. The overlying skin was red and the right labinus was swollen and red. The tumor was rather freely movable, and could be pinched up The child was much emaciated. Features drawn.

Leucocytes 42,000.

A diagnosis was made of strangulated inguinal hernia of a loop of gut and operation advised.

Operation — Ether anæsthesia.

The sac was exposed directly under the fibers of aponeurosis of external oblique. When the sac was opened a firm, dark red, egg-shaped mass, closely resembling splenic tissue in color and consistency, came into view. Traction on this mass disclosed a pedicle in which were two markedly enlarged veins and further traction brought the right tube and the uterus into the opening. As strangulation had gone on for such a time that marked changes had evidently occurred in the ovary, the pedicle was transfixed and ligated and the ovary removed. The tube and uterus were returned to the abdomen and the hernia opening closed in usual way.

Recovery was uneventful and the child was discharged on the 16th day and referred back to the pediatric clinic for further care.

PATHOLOGICAL REPORT

Gross Examination. Specimen is a smooth, encapsulated mass, dark red in color, about 2.5x2x1.5 cm. in size. Cuts with about the same resistance as normal spleen. The cut surface is uniformly dark red in color and smooth.

Microscopical examination shows the specimen to be an ovary which is everywhere infiltrated with blood. This has occurred to such an extent that the structure of the medulla cannot be made out and seems to be entirely displaced by blood elements. In the cortex however, many primitive follicles are seen, although many are distorted and the general structure destroyed by the blood. Very little change has occurred in the red blood cells — almost no fibrin being present. Small areas of leucocytic infiltration occur throughout the section.

RADICAL OPERATION FOR THE CURE OF OBLIQUE INGUINAL HERNIA

By F. GREGORY CONNELL, M. D., Oshkosh, Wisconsin

In the radical operation for the cure of oblique inguinal hernia, any particular method may, occasionally, be unsuitable; but the aim of such an operation should be to *replace* the structures in their normal relations.

The normal and the abnormal relations are diagramatically depicted in Figures 1 and 2.

In order to replace the abnormal relations of Fig. 2 to the normal, as is shown in Fig. 1, the steps shown in Figs. 3 to 9 will be necessary.

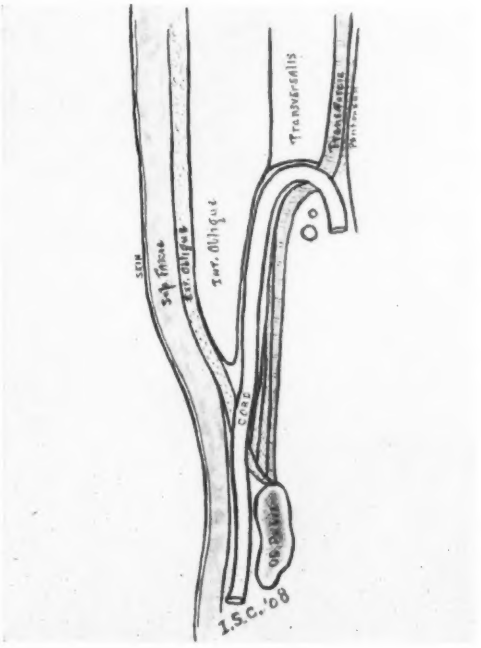


Fig. 1.

Fig. 1. *Normal relations of the inguinal canal.* The *parietal peritoneum* is smooth and even, with no outward bulging. The *internal ring* in the transversalis fascia, closely surrounds the spermatic cord, and is located above and internal to the external ring. The *internal oblique muscle* arises from the outer ⅓ of Poupart's ligament, which covers and protects the internal ring. The *inguinal canal* is oblique and transmits the cord. Protrusion of viscera is prevented by this obliquity, because with an increase of intraabdominal pressure, the walls of the canal are held in apposition. The *external ring* is triangular, with its apex above, where it is reinforced by the intercolumnar fascia.

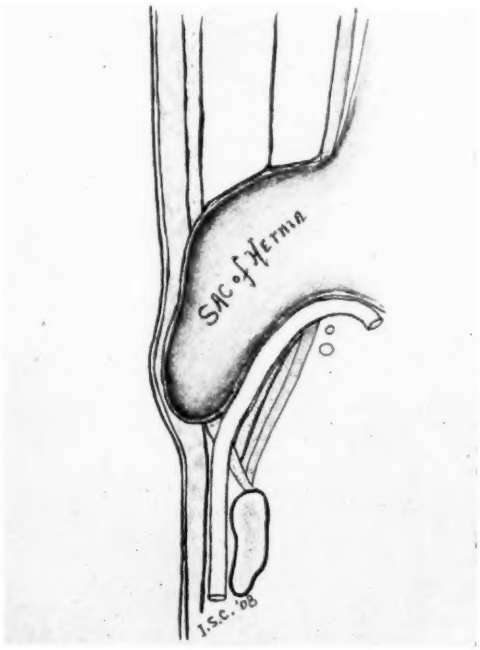


Fig. 2.

Fig. 2. *Relations of inguinal canal with oblique hernia.* The *parietal peritoneum* protrudes through the internal ring, forming the sac of the hernia. The *internal ring* is dilated, extending downward and outward toward the external ring, and surrounds the sac in addition to the cord. The *internal oblique muscle* arises from the outer half or less of Poupart's ligament, leaving the enlarged internal ring, either partially or completely unprotected. The *inguinal canal* is less oblique, shorter, and larger than normal, because of the descent of the internal ring, and the presence of the sac in addition to the cord. The *external ring* is enlarged, and extends upward toward the internal ring.

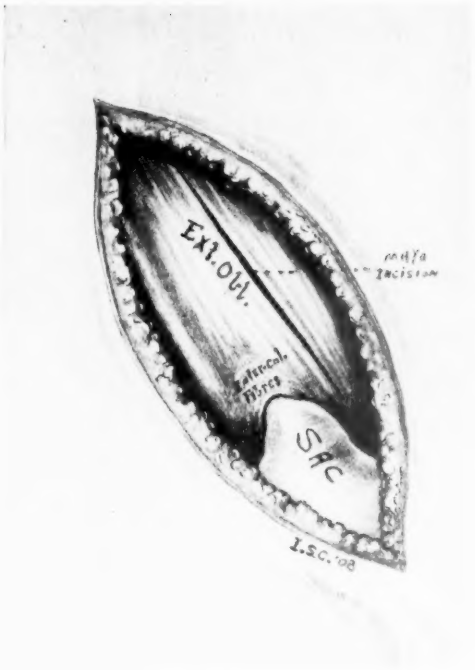


Fig. 3.

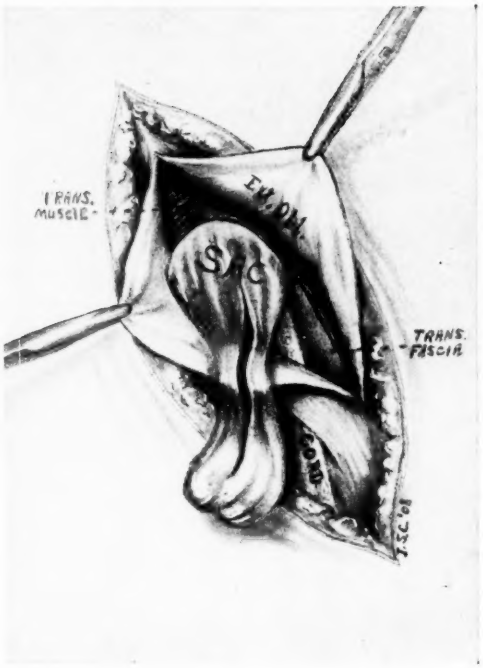


Fig. 4.

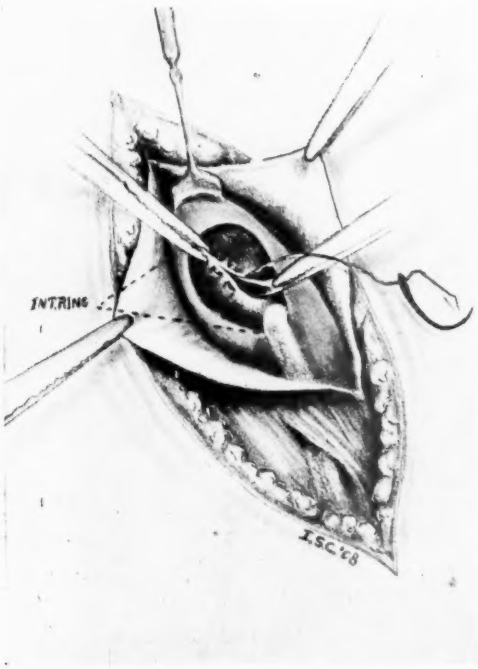


Fig. 5.

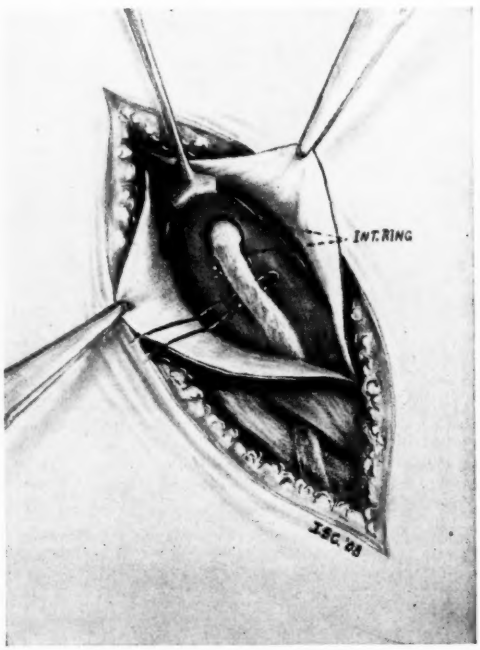


Fig. 6.

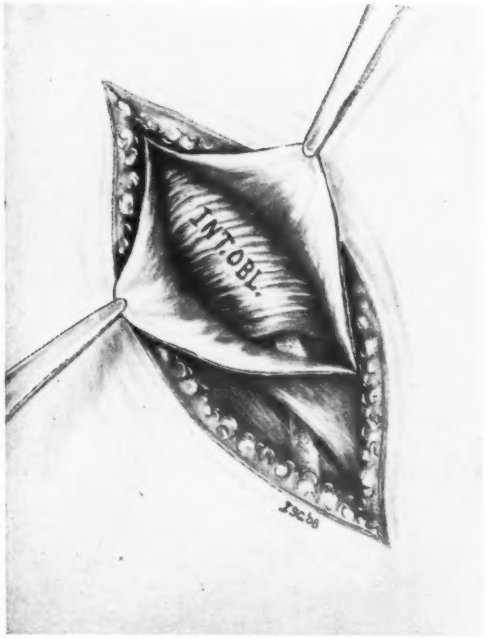


Fig. 7.

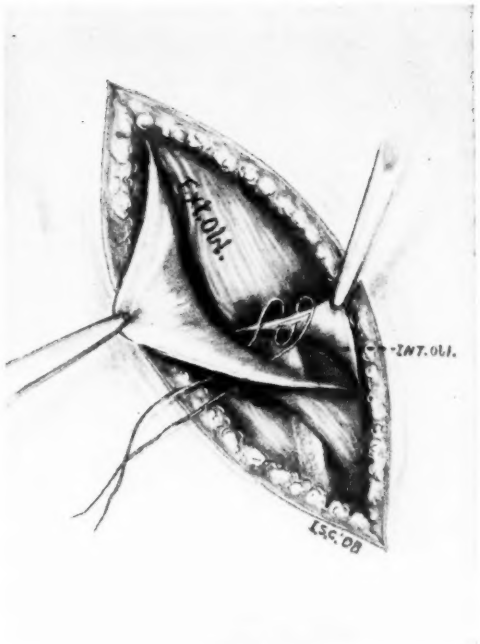


Fig. 8.

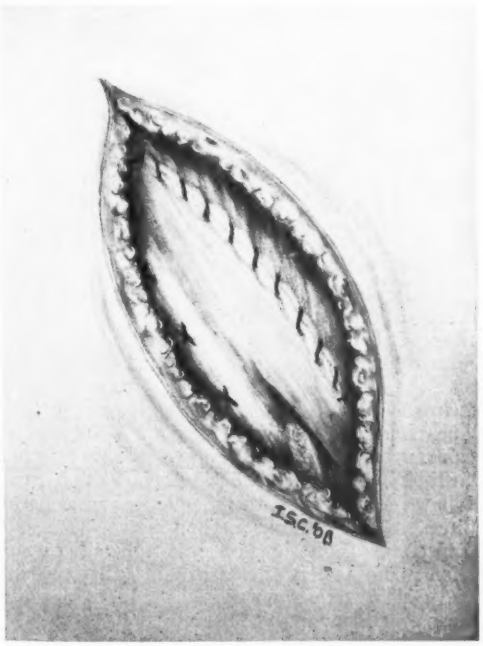


Fig. 9.

Fig. 3. Step 1. Incision of the skin and superficial fascia, with exposure of the aponeurosis of the external oblique, and the sac at the external ring. Incision of the aponeurosis, parallel with its fibers, preferably by the Mayo incision, as this preserves the intercolumnar fibers.

Fig. 4. Step 2. Retraction of the flaps of the external oblique, with exposure of the inguinal canal; isolation of the sac, and reduction of its contents.

Fig. 5. Step 3. Removal of the sac, with redundant parietal peritoneum at the internal ring. Closure of the peritoneum as in usual abdominal incision. (Doing away with any outward bulging of the peritoneum at the internal ring, thus avoiding a potential recurrence.)

Fig. 6. Step 4. Repair of the internal ring by sutures in the transversalis fascia which pass beneath the cord. Such sutures may be inserted without displacement of the cord. The dilated internal ring is diminished in size from below upward. (The relative position of the inlet and the outlet of the canal is now more nearly normal, with the resultant valve-like action of an oblique canal.)

Fig. 7. Step 5. Reconstruction of the anterior wall of the inguinal canal by suture of the internal oblique to the outer two-thirds of Poupart's ligament. (This acts as an active muscular check to the protrusion of any viscera through the internal ring. Ferguson.)

Fig. 8. The median flap of the aponeurosis of the external oblique may be sutured at the same time, with the internal oblique, by the "imbrication" method of Andrews.

Fig. 9. Step 6. Suture of the aponeurosis of the external oblique at the line of the Mayo incision.

Step 7. Suture of the superficial fascia and skin.

THE DIAGNOSIS AND TREATMENT OF ECTOPIC GESTATION

By T. A. STODDARD, Pueblo, Colorado

At the present time there seems to be a laudable degree of interest among members of the medical profession in the subject of ectopic gestation. While the greatest part of the discussion appears to be in relation to operative procedure, I think that a few words about diagnosis would not be untimely. To make a diagnosis before rupture of the tube is certainly not always possible, owing to the fact that many patients do not call in a physician until that accident has happened. In fact, in some cases the patients have no warning that there is any trouble or even that they are pregnant. Allow me to quote from a paper which I read at a meeting of the Colorado State Medical Society, and which was published in "Colorado Medicine" in August, 1907.

"The symptoms of ectopic pregnancy previous to the fifth week are exceedingly obscure, but after that time there are usually sufficient symptoms to call the attention of the woman to the fact that all is not well, particularly if she happens to be a multipara. She is conscious of occasional sharp cutting pains on one side or the other, determined by the tube in which the pregnancy happens to be located. She has missed one period, or as she will say she has gone over her usual time a few days or a week or two. Very frequently at about six weeks, there is a bloody discharge from the uterus, which the patient thinks is her delayed menstrual period, but if she has previously had pain during her menstrual nisus, she is surprised to have the flow come on without any pain. On this point alone, I would be almost willing to make a diagnosis of tubal pregnancy. If this discharge is carefully examined, the false decidual shreds will be observed. The patient frequently complains of a feeling of distress in the rectum, and of an unpleasant desire to defecate, when she knows her bowels are already emptied. The uterus enlarges almost as rapidly as if the pregnancy were normal, until the false decidua has been expelled and then it seems to become somewhat reduced in size, but not to its normal unimpregnated state. Occasionally the first pain that the patient seems to notice is sudden and violent, and is most likely to occur when the patient is at stool. She will suddenly scream with pain, and then become quickly prostrated, or go into a state of collapse, from which she may never rally but die in a few hours. Again she may rapidly rally from the state of syncope, and be comparatively well for a day or even a few days, and if the hæmorrhage was severe, she will complain of a pain under the point of the scapula. I have noticed this so frequently that I cannot help placing some diagnostic value on it. The pulse, after an attack of this kind, will be rapid, small and thready, but it may soon recover itself. If the hæmorrhage is profuse she will have a cold sweat, and will frequently vomit, and if a meal has recently been ingested, she will completely empty her stomach, and then call for water. There is not as much dullness as might be expected, from the large quantity of blood frequently found in the abdomen. If the tendency is toward tubal abortion, the pain is not so sharp, but continuous, accompanied by a feeling of 'bearing down' and frequently with a feeling of faintness."

My experience since the reading of the paper quoted from leads me to insist more strongly than ever on the fact of the overdue menstrual flow coming on painlessly, where in previous periods there was pain. Again, the desire to strain at stool after the bowels have been emptied, coupled with feeling of faintness, and a delayed menstrual period cannot be too strongly insisted on as of the greatest diagnostic value. The violent pain under the point of the scapula after a profuse internal hæmorrhage I have noticed in sixty per cent of the cases that have come under my notice. The first case of ectopic gestation I had the opportunity of seeing in this city, was that of a woman doctor, who was here on a visit. She was taken suddenly ill shortly after midnight and a doctor called at once. I saw her the next morning at ten o'clock and found her rallying from a state of collapse, and with a large flax-seed poultice over the point of the scapula. She refused operation and died within twenty-four hours after I first saw her. Post-mortem revealed the right tube ruptured near the uterine end, and a demonstrable fœtus enclosed in its sack and still adherent to the ruptured tube. The abdomen was full of blood and the patient evidently died not from shock but loss of blood. Of thirty-five cases seen during the past ten years, I have operated thirty-two, with a mortality of three. Of the three seen and not operated all died. One of the three cases that died after operation was operated within six hours after rupture but died in spite of normal salt and every other means of support and stimulation. She had simply bled to death before she came to the oper-

ating table. The other two that died were not seen until after suppurative processes had existed for weeks and the patients were profoundly septic.

Of the twenty-nine recoveries seven were operated before rupture and the fœtus in each case demonstrated, and one of these cases had a pregnancy in each tube, one about ten weeks and the other about five. I did not diagnose a double pregnancy, until the belly was opened.

Eight of my cases were operated within ten hours of the primary hæmorrhage, the subjects being collapsed. The belly was found full of blood, and in five of these cases the hæmorrhage had not ceased. Of the three cases seen and not operated, one of which I have already mentioned, all of which died, there was no secondary hæmorrhage, as the patients all died within thirty hours after the first rupture, and therefore died of the primary hæmorrhage and from actual loss of blood. Five cases had had two separate hæmorrhages, at a distance of several days apart, as evidenced by the blood clots in the abdominal cavity, as well as by the history, and were operated during the progress of the third bleeding spell. Eight were cases of tubal abortion, complete or partial and the subjects had lost only a small amount of blood, except in one case where the use of normal salt solution was necessary. In fact, I have rarely seen severe hæmorrhage from tubal abortion. One case where the rupture had occurred between the folds of the broad ligament, a large hæmatoma had formed and had remained there for fifteen days before operation and without any recurrence of the hæmorrhage.

In regard to the time to operate, each case must be taken by itself and no hard-and-fast rule can be laid down, but the judgment of the surgeon is the only safety of the patient. To say that when a hæmorrhage has taken place and the patient does not show profound shock, the proper thing to do is to wait, while if the patient appears to be in grave danger then operate, does not seem to me to be good advice. I have never seen a case of ruptured ectopic gestation recover without operation, and I have never seen a case die due to operation, but I have seen them die in spite of operation. I can understand that where the belly is full of blood, the omentum rolled up above the umbilicus holding in its folds a large amount of blood clot, and attempts made to remove this blood, in fact, to clean out the abdominal cavity, that a patient would very naturally have a very poor chance to recover. I do not think that the omentum which is almost invariably rolled up as I have described, should be unrolled, but I have never made any attempt to remove the blood from the abdomen except that as soon as the abdomen is opened I have the assistant pass a nozzle to the deepest part of the abdominal cavity and pass a good stream of normal salt solution through it during the whole time of the operation. This will wash out a great deal of the effused blood and will have a good effect on the patient beside.

I believe that if a woman has an ectopic pregnancy and has a hæmorrhage before the end of the tenth week of gestation, it is safe to assume that rupture of the tube has occurred, and surgical intervention is immediately demanded, for early rupture indicates that the ovum is near the uterine end of the tube.

APPENDICITIS RESEMBLING URETERAL CALCULUS

By M. G. SEELIG, M. D., St. Louis, Missouri

Recent surgical literature has contained many references to the possibility of confusing the symptom-complex of ureteral stone with that of appendicitis. There has not been recorded a single concrete example, however, in which this difficulty has been encountered. The following case is cited in order to place on record an instance of appendicitis in which the symptoms resembled those of ureteral stone so closely in all essential and minor details as to defy differentiation.

I. T., 34 years old, a saleswoman by occupation, presented herself for examination February, 1907.

Family History. Negative.

Past History. Ten years ago the diagnosis of pulmonary tuberculosis was made after a moderately profuse hæmoptysis. The patient underwent a "cure" at a Northern resort, and has had no return of symptoms. Seven years ago the patient was seriously ill as the result of a criminal abortion, performed during the second month of pregnancy. From that time up to a year ago, she has been perfectly well. Menstrual and urinary functions have always been normal.

Present History. Dates back one year, when the patient began to experience a backache, accompanied with frequent and painful urination. The pain was at first situated about over the right posterior superior spine of the ilium, but later it radiated downward and forward, toward the right groin. This pain has been constant during the past year, sometimes being more marked in the loin, but

X-ray, showing supposed ureteral calculus.

at other times more marked in the right flank. At times this pain was severe and cramping in nature, but most of the time, it was a dull bearing-down ache. Six months ago the urine contained quite a noticeable quantity of blood, just after an acute paroxysm of pain. The patient was not menstruating at the time that this blood was passed. Blood was never observed before this; it has not been noticed since, and there never has been any close relationship between the pain and urination. During the past year, there has been a loss of twenty pounds in weight. There have been no night sweats, and no elevation of temperature that the patient knows of.

A physical examination made at the time of the patient's first visit was negative in all details. Tubercle bacilli could not be demonstrated in the urine, which was also free from sugar, albumen, and abnormal morphological elements. Twenty-four hours after this examination, there was an acute attack of pain, which was so severe that the patient fainted, and during which bloody urine was passed. The pain was distributed over the whole of the right abdomen, and there was marked tenderness in the right loin and along the course of the right ureter. This attack was unaccompanied by an elevation of temperature, and there was only a transient rise in the pulse rate. There was no rigidity of the abdominal musculature, and no symptoms referable to the gastro-intestinal tract.

After this acute attack had subsided, the ureters were catheterized by Dr. H. McC. Johnson, with the result that a catheter passed up to the left ureter freely, and drained normal urine; the catheter inserted into the right ureter met with an obstacle, about two inches from the bladder. It was impossible to get by this obstruction, even with a stylet-armed catheter. As a result of this ureter catheterization, the existence of a ureteral stone was suspected, and in order to clear up this suspicion, an X-ray examination was ordered. Dr. R. D. Carman made five exposures, at different times, and each plate showed an unmistakably clear shadow of a stone lying within the course of the intrapelvic portion of the ureter. The accompanying plate shows how definite the picture was.

On the basis of the acute attacks of colic, the hæmaturia, the obstructed ureter, and the X-ray findings, it was determined to expose the ureter extraperitoneally, and to search for the stone. This was done, and the ureter palpated from the kidney to the bladder, with the result that no stone was felt within its lumen. During the course of the exploration, however, it was noted that the ureter was kinked at the site where it crosses the brim of the pelvis, and also that at this point there was a dense mass, the size of a cherry, adherent to its anterior surface. In order to determine what this mass was, the peritoneum was opened. Intraperitoneal exploration disclosed a subacutely inflamed appendix, containing a hard coprolith, adherent to the ureter. The appendix was removed, the peritoneum sutured, and the wound in the soft parts closed around a small drain. Recovery was uneventful, and the patient has remained perfectly well during the fifteen months that have elapsed since operation. The appendix, before it was opened, was buried in a large beef heart, which in turn was placed on a sacrum, and photographed by the X-ray. The resulting plate showed a clear picture of a stone, corresponding to the shadow secured before operation. On opening the appendix, it was found to contain a calcified coprolith, formed about a small seed as a nucleus.

A CASE OF CHOLEDOCHOTOMY FOR CHOLESTERIN STONE WITH ABSENCE OF GALL-BLADDER

By JULIUS NIEMACK, M. D., Charles City, Iowa

A SHORT while ago, it fell to my lot to make an emergency operation for obstruction of the common bile duct. The conditions discovered were so anomalous and interesting, that a publication seems justified.

Mrs. J. D., living on a farm 6 miles away, sixty years old and well nourished, is (after a preliminary soreness over the abdomen, which has lasted a couple of weeks) taken sick on April 6th with cramps and vomiting. A clay-colored bowel movement is brought on by enema. During the following days enemas and hypod. physostygmine fail to move the bowels. Nothing is retained by the stomach; temperature ranges from 101 to 104 degrees, slight chills, steady pain through the shoulder, increasing icterus. Large doses of morphine fail to give more than transient relief.

In her history is one other attack similar to this nine years ago, from which she recovered very slowly. Her complexion has always been slightly yellow, and light attacks of "indigestion" were frequent. Eight years ago hysterectomy for irregular hæmorrhages was done.

The family insisted that surgical measures should be applied, before it would be too late. As under the conditions a transport of the patient was out of question, we had to operate in the house and use what light could enter through the low windows. With the operating-table elevated so as to slant toward the feet and a sandbag below the ribs, the removal of the stone from the upper third of the duct was finally accomplished without any mishap. But in looking for the anatomical landmarks, I was terribly annoyed by the apparent absence of anything that could be considered as gall-bladder.

As there were no inflammatory adhesions, the stone was speedily located between thumb and index; but the incision of the duct was of course postponed until the whole field was accessible to the eye. No gall-bladder came into view. Taking it for granted that this organ must be somewhere either shrunken, or misplaced, the posterior half of the liver was palpated without any result. Speaking in a surgical and rough anatomical way, the organ in quest was absolutely absent.

There was no indentation, no induration of the peritoneum, or Glisson capsula, no difference in the evenly colored, smooth liver surface. The liver ducts emerged from the porta hepatis and united to the common duct; in front of them was a small body, size of a pea and of soft consistence, feeling like a normal gland.

The stone could be pushed back toward the liver ducts; how far this was possible, has for obvious reasons not been tried. It was pure white, size and shape of a small bird's egg, weight 18½ grains.

The duct was drained, and for the first three days a large amount of bile discharged. After the first stool on the third day this discharge became rapidly less; till three weeks after operation it had practically stopped

The recovery was uneventful.

The above observation seems exceedingly important. The annoying feature of such anomaly in an emergency case like ours must be experienced to be appreciated. The regular perusal of the current literature had not prepared me for this experience. Therefore, I want it recorded for others' benefit.

About the correctness of the observation there can be no doubt. Every surgeon, who has opened the common duct, knows that one needs good light to do it, and must have the lower surface of the liver in plain view. A contradiction on that account is, therefore, not anticipated.

Moynihan's monograph is quite explicit on malformations about the bile-organs, but gives nothing which fits our case. Will Mayo, in a personal letter, states that he has frequently found the gall-bladder shrunk to the size of a nut. How much inflammation and induration there was in these cases, he fails to mention; but states that he never saw anything like what I had described to him.

Where did the cholesterin stone form? According to our teachings, the very presence of such a chemical body in such masses would make the presence of the bladder imperative. Neve theless, "surgically speaking" it was absolutely absent.

ABSTRACTS OF CURRENT LITERATURE

DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D.
FREDERIC A. BESLEY, M. D.
WM. C. DANFORTH, M. D.
AIMÉ PAUL HEINECK, M. D.
E. WYLLYS ANDREWS, M. D.
WM. R. CUBBINS, M. D.
M. G. SEELIG, M. D.
GEO. E. BEILBY, M. D.

An Operation for the Stiffening of the Ankle-joint in Infantile Paralysis. JOEL E. GOLDTHWAIT, M. D., Boston. *American Journal of Orthopedic Surgery*, January, 1908.

Curved incision around the outer malleolus. Cut peroneal tendons, calcaneo-astragaloid tendons, and astragalo-scaphoid and middle fasiculus of external lateral ligament, exposing calcaneo-astragaloid articulation. The bones of this joint are denuded of cartilage and synovia until fresh bone is exposed. Astragalus is next loosened from the tibio-fibular articulation and the joint surfaces here destroyed. If the line of weight still puts the foot to the outside, a wedge-shaped piece with the base inward is removed from upper part of astragalus and an oblique osteotomy of the fibula performed — that all denuded surfaces are brought into accurate contact. In this way the ankle-joint can be made perfectly rigid, and the joints of the fore part retain motion. The peroneal tendons and external lateral ligament are joined together and all placed in a firm cast, which remains on two weeks before removed at all.

WILLIAM R. CUBBINS.

Arterial Suture. (Die Arteriennaht.) DR. FRANZ FAYKISS. From the Surgical Clinic in Buda-Pest. Prof. E. Reczey, Director. *Beiträge zur kleinischen Chirurgie, Band* 58.

Faykiss gives a résumé at length of the literature bearing upon the question of arterial suture and discusses the procedures of various experimenters in this field.

Faykiss' own experiments were carried out upon dogs, the common carotid being selected and in most cases both carotids being cut and sutured at the same sitting. Very small curved needles were used and very fine silk.

The first 10 sutures were made by means of a technique closely resembling that of intestinal suture. The first row in 5 cases took in all coats, and the other 5 only the adventitia and media. The outer row took in only the adventitia. Four of these dogs showed no symptoms indicating stoppage of the cerebral blood supply, and 3 months after operation a pulse, rather weak but palpable, could be found above the site of operation.

Of 8 carotids observed at autopsy 3-3½ months after operation 7 were found to be completely obliterated, the vessel being contracted at the point of suture. The pulse noted in four cases is explained by the fact that the arteria cervicalis ascendens was so greatly enlarged that it was almost half the size of the carotid, and, lying so close to it, gave a false impression.

The next series of sutures was made by Payr's method, using a magnesium tube of 3-4 mm. calibre. One dog died as a result of the operation. Of the remainder, autopsies on which were made 6-7 weeks after operation, 5 cases were found to have been successful on one side only. In the remaining 4 cases both carotids were completely occluded.

Of the experiments made with Murphy's technique only 2 were successful, one dog living 7 days and the other 19 days. The 7-day case showed an extreme degree of contraction.

The last 10 cases were operated by Faykiss' method, in which a particular attempt is made to make a very accurate juncture of endothelial surfaces, making use of two V-shaped sutures, applied opposite to one another, with a second circular deep suture placed over them. Of the 10 cases 5 were found free from thrombi, 8, 23, and 29 days after operation. But slight contraction was present. In 3 cases a completely bad result occurred. In the remaining 2 cases thrombi completely filled the vessel lumen.

Faykiss ranks the procedures for arterial suture according to their efficiency as follows — first, those in which the continuity of the intima is broken as little as possible, as in his own procedure; second, Payr's method; and third, the invagination method of Murphy.

Microscopic examinations of material from the operated dogs were made.

Faykiss sums up as follows:

1. As in any other operation, success depends upon aseptic work.

2. It is by no means a simple affair to free the artery for any distance from its sheath.

3. Provisional hæmostosis is most safely made by finger-pressure. This is, however, not to be recommended on account of its unreliability. It is best to use instruments.

4. The circular anastomosis may be made by means of any one of the four methods described.

5. Of these the best is that one which causes the least narrowing of the lumen, and which causes the intima to come together most accurately.

6. Sutures which take in the whole thickness of the arterial wall are recommended because they bring the surfaces of the intima together better and because they do not tear out. Suture material should be silk which, to avoid bleeding from the needle-wounds, should be double, both ends being of equal length.

7. During the operation the arterial wall is not to be grasped with dissecting forceps, nor is the intima to be roughly handled.

8. When the sutures for any reason are irregularly applied, and in consequence a hæmorrhage ensues, it is best to put in a re-inforcing suture which takes in all coats.

9. Suture of the vessel-sheath is not necessary. This heals in a very short time without suture.

10. The interval remaining between the wound edges is always provisionally filled with blood-clot. The portions of sutures reaching into the lumen are also always at first covered with small clots.

11. During the healing process the endothelium plays the most important role. Second in importance are the connective tissue cells of the adventitia. The weakest is the part of the middle coat.

12. As a result of the regeneration of the elastic fibers a restitutio ad integrum, is, at least partially, produced. W. C. DANFORTH.

Comparative Strength of the Adductor and Abductor Groups in the Foot. ROBT. B. OSGOOD, M. D., Boston. *The American Journal of Orthopedic Surgery*, January, 1908.

Dr. Osgood reports the results of tests in 123 cases, and divides his cases into four classes:

1. Normal feet, No. 22; here the ratio was adductor, 10; abductor, 8.2.

2. Symptomless pronated feet, No. 23; here ratio was adductor, 10; abductor, 10.5.

3. Weak or strained feet; flexible but markedly pronated, No. 46; adductor 10; abductor, 10.8.

4. Cases of acute flat feet, 32 cases; adductor 10; abductor, 12.2.

The author shows in this way that the adductors are normally stronger, but the latter group are favored by the weight-bearing planes of the joint surfaces, and may become so strong as to overbalance the adductor group, and gradually cause flat foot. In order to overcome this he has devised a machine for the exercise of the adductor group, both in dorsal and planter group flexion. The results are good.

WILLIAM R. CUBBINS.

Gonorrhœal Exostosis of the Os Calcis. CHAS. H. JAEGER, M. D., New York. *The American Journal of Orthopedic Surgery*, January, 1908.

Dr. Jaeger reports cases where, following an attack of gonorrhœa, the patient begins to complain of exquisitely sensitive joints in the middle of one or both heels. These cases, when skiagraphed, show exostoses at the anterior portion of the tubercle of the os calcis, which may be rounded or pointed. The removal of these exostoses with a chisel or sharp spoon has afforded perfect results after drugs had failed completely. One case showed pure cultures of gonococci. The histo-pathology shows a production of new bone in inflammatory tissue. WILLIAM R. CUBBINS.

Concerning the Etiology and Treatment of Congenital Talipes Calcaneo-valgus. WALTER G. STERN, M. D. *The Journal of Orthopedic Surgery*, January, 1908.

Presents twenty-three cases of congenital talipes calcaneo-valgus, some of which were accompanied by other congenital deformities. These twenty-three cases were all over corrected as soon as possible after birth, and the results uniformly good. From these cases and an exhaustive search through the literature he draws the following conclusions as to etiology and treatment:

1. Besides the recognized change in the form and position of the foot, one of the leading characteristics of congenital talipes calcaneo-valgus is the muscle unbalance, consisting of passive contractures in the dorsal flexors and peronei muscles and overstretching, lengthening, relaxation, and atrophy of the planter flexors and supinators and tendo Achilles.

2. These muscle changes are not due to changes in the central nervous system, but are due to a forced position of the foot within the uterus in pronation, abduction, and dorsal flexion.

3. This forced position is due to an abnormal intra-uterine pressure, usually coming from a partial lack of liquor amnii.

4. All cases should be treated as early as possible, by means of over correction and fixation. The treatment is a cure for the muscle unbalance and usually restores the form of the foot.

5. Both the type of muscle unbalance and the results from such static treatment are additional proof of the pressure theory. WILLIAM R. CUBBINS.

Excision of Carcinoma of the Rectum by the Combined Method. JOSEPH A. BLAKE, M. D., *Annals of Surgery*, 1908.

Dr. Blake reports three cases of excision of the rectum, and draws the following conclusions:

1. That no single operative procedure should be carried out to the exclusion of others.

2. The decision between the perineal and the combined methods depends chiefly upon the feasibility of preserving the efficiency of the sphincter ani muscle, provided the growth is not movable by the low route.

3. That when the combined method is used an immediate abdominal anus should be formed, unless the continuity of the natural passages can be restored with exceptional facility.

4. That the institution of the colostomy at a previous operation is an embarrassment rather than an aid.

The Relation between the Arterial Blood-Pressures of Surgical Kidney Affections and Appendicitis (Ueber das Verhalten des arteriellen Blutdruches bei Chirurgischen Nieren-inkrauhungen und Appendicitis). DR. TAKIJIRO KATO OF TOKIO AND DR. KATZENBURG. *From the General Hospital of Hamburg-Eppendorf. Beiträge zur Klinischen Chirurgie. Band.* 58.

These investigators observed 25 cases, 17 of affections of the kidney, 5 of appendicitis, 2 of abdominal tumors and 1 case of gall-stone disease. Of the renal cases 11 were one-sided and 6 double-sided. Of the one-sided cases, 6 were cases of suppurating kidney, 3 of tuberculosis, 1 tumor and 1 stone. Of the double-sided cases 3 were cases of chronic nephritis, 1 case of cystopyelitis, and 1 case which as a result of operation already had but one kidney.

Of the cases of appendicitis 4 were chronic cases, and 1 case was appendiceal abscess.

It was found that cases of one-sided renal suppuration showed increased arterial tension which decreased with relief of the suppurative process. The known fact of increased pressure in double-sided kidney lesions was confirmed by the writers' observations. Non-inflammatory processes in the abdominal cavity showed no influence on the blood-pressure. Cases of acute and subacute appendicitis on the other hand showed a remarkable increase of pressure.

Twelve cases of acute appendicitis, in addition to those noted above all showed a pressure of 150 or more. Several cases of acute and subacute inflammatory processes in the female genitalia showed normal blood-pressure. W. C. DANFORTH.

Surgical Treatment of Nephritis by Decortication, (Traitement chirurgical des néphritis par la réno-decortication). ERTZBISCHOFF. *Archives générales de Chirurgie,* April, 1908.

The author discusses the work of Edebohls, Kasper, Albarran, Bernard and Pousson. The renal tension present in nephritis is of special interest from the standpoint of renal decortication. In this condition there is an increased blood supply, a proliferation of the connective tissue, or an œdema of both connective tissue and epithelium, so that the contents of the slightly elastic capsule are increased, causing an increased tension. It is probable that this tension causes nephralgia and sometimes hæmaturia, because a decortication relieves them both, but it does not and cannot cure nephritis.

The technique is as follows: Lumbar incision, delivery of the kidney, incision of capsule and stripping of same from the cortix. The kidney is then fixed by Albarran's method.

The result is the formation of a new capsule, thick and very vascular, but these new vessels bring very little compensatory circulation to the kidney parenchyma. It is indicated in acute nephritis, in exacerbations of chronic nephritis, frequent renal hæmaturia, persistent oliguria, persistent high percentage of albumen, nephralgia. The author, however, does not believe that this operation can modify previous changes in the connective tissue or epithelial changes. In acute exacerbations or chronic changes, the author incises the kidney in conjunction with decapsulization. AIMÉ PAUL HEINECK.

Surgical Aspect of Graves' Disease with Reference to the Psychic Factor. GEORGE CRILE, M. D., *Annals of Surgery,* Vol. XLVII, June, 1908.

In this article the author makes a strong plea for the consideration of psychic excitation as a factor in the production of hyperthyroidism. His conclusions are based on some animal experiments made on dogs suffering with goitre, and on clinical observations. He maintains that the surgical interference should take place without the patient's knowledge of the time of the operation. To this end the patient is given morphia prior to the operation, and the anæsthetic administered in the room before removal to operating room. He summarizes as follows:

"There is evidence to show that the thyroid may discharge a pathological amount of its secretion in response to the psychic excitation. This does not imply an explanation of the etiology. The symptoms of Graves' disease, partially or entirely, disappear after removal of a sufficient amount of thyroid gland. The psychic factor is the most important in surgical risk. This factor may be eliminated by 'stealing' the gland. When eliminated, the operative risk seems greatly reduced." J. F. CHURCHILL.

Lumbar Anæsthesia and its After-Effects (Die Lumbalanästhesie und ihre Neben und Nachwirkungen). DR. KARL BORZÉKY. *From the Surgical Clinic in Buda-Pest. Prof. E. Reczey, Director. Beiträge zur Klinischen Chirurgie. Band.* 58.

Borzéky recounts the experience of the Buda-Pest clinic with 300 cases of lumbar anæsthesia. Stovain was used and is regarded by the writer as the best, and as giving the most lasting anæsthesia. The dose for an adult was at first 0.80 gram but this was later reduced to 0.60 gram. Individuals under 16 years received one-half the above dose. An amount of cerebrospinal fluid equal to the stovain solution to be injected was first allowed to escape through the needle.

Of the 300 cases only 6 are stated to have been unsatisfactory, the anæsthesia coming on late or disappearing early. In one case, although complete motor paralysis was present, circumscribed areas sensible to pain remained.

As to the length of anæsthesia, Borzéky states that it was satisfactory, in one case a double inguinal hernia with adhesions requiring 1½ hours to complete was operated without any sensation of pain becoming noticeable.

The unfavorable accompaniments which most frequently were seen were dyspnœa, occurring as a rule 10-15 minutes after injection; headache, nausea, indistinct vision, and a feeling of anxiety. Objectively pallor, sweating, vomiting, irregularity of the heart and respiration were observed.

In some cases elevation of temperature after anæsthesia was seen. No explanation is given.

Of the 300 cases the method gave results satisfactory to the writer in 90 per cent. In 1.3 per cent the anæsthesia was not sufficiently extensive and in 8.7 per cent it could not be used.

His conclusions are as follows:

1. Lumbar anæsthesia is valuable and in many cases indispensable, but cannot be regarded as entirely without danger, at least with the present day technique. Until we learn to avoid its disagreeable accompaniments and after-effects, it is not suited to general use.

2. It is very important to remove a quantity of cerebral fluid equal to the amount of fluid to be injected, to allow the patient to remain in a sitting position 2-3 minutes and finally to place him with the head elevated.

3. Lumbar anæsthesia is recommended only for those operations which are carried out below the level of the umbilicus, and which cannot be done under local anæsthesia. W. C. DANFORTH.

Splenectomy, with Statistical Summary of Operations up to the Year 1908. GEO. BEN JOHNSTON, M. D., Richmond. *Annals of Surgery*, July, 1908.

Johnston has collected in all 708 cases of splenectomy, with a total mortality of 27.4 per cent. Of these, 353 cases were done prior to 1900 and were collected and published in a monograph by Bissel-Hagen in that year. This series shows a mortality of 36.3 per cent and does not include partial splenectomies. The author has been able to find, since that date, reports of 355 splenectomies, with a mortality of 18.5 per cent.

In estimating the value of these statistics, attention is called to the fact that a very large number of these cases are reports of single operations by different operators. In addition to this, the tendency to report only successful cases must be remembered.

Splenectomy has been performed for the following lesions, with results as shown:

1. Idiopathic hypertrophy of spleen; 74 cases, 21 deaths.
2. Ectopic spleen with idiopathic hypertrophy; 60 cases, 6 deaths.
3. Ectopic hypertrophied spleen with twisted pedicle; 27 cases, 8 deaths.
4. Malarial hypertrophy; 61 cases, 8 deaths.
5. Ectopic malarial spleen; 40 cases, 1 death.
6. Ectopic malarial spleen with twisted pedicle; 12 cases, 2 deaths.
7. Banti's disease; 61 cases, 12 deaths.
8. Cysts of spleen; 43 cases, 5 deaths.
9. Leukemia; 49 cases, 43 deaths.
10. Tuberculosis of spleen; 10 cases, 2 deaths.
11. Sarcoma of spleen; 12 cases, 4 deaths.
12. Abscess; 9 cases, 1 death.
13. Wounds and injuries; 150 cases, 51 deaths.
14. Miscellaneous; 13 cases, 2 deaths.

If the cases in which splenectomy was performed for injury of the spleen are excluded, there remain 242 splenectomies in the period from 1900 to 1908, with a mortality of 13.2 per cent. It is noted that but 7 splenectomies have been reported since 1900, in cases of leukemia. Only two of these cases are reported as successful. J. F. CHURCHILL.

Studies in Resuscitation: The General Conditions Affecting Resuscitation of the Blood and of the Heart. F. H. PIKE, C. C. GUTHRIE and G. N. STEWART. *The Journal of Experimental Medicine*, Vol. X, No. 3.

These valuable studies which have been carried on by the authors over a period of several years present many points which are instructive to the surgeon as well as the physiologist. While they have been directed mainly toward the resuscitation of individual organs or systems, still they contribute many valuable facts which should aid the surgeon in the technique of total resuscitation following such accidents as poisoning from anæsthesia, hæmorrhage, drowning, and other forms of asphyxia. The question of maintaining blood pressure by the introduction into the vascular system of artificial fluids and by bandaging the limbs and abdomen, the resuscitation of the heart by extrathoracic and intrathoracic massage, the effect of adding drugs to the injection fluid, are some of the problems which have been investigated in these experiments. These studies emphasize the importance and scope of surgical physiology, a subject which has as yet received but meagre regard in the teaching and application of surgery.

Their results may be briefly summarized:

1. Blood when defibrinated, soon loses its power to maintain the activity of the higher nervous centres, and its nutritive properties for all tissues quickly diminish.

2. Artificial fluids as a substitute for blood are not satisfactory.

3. The proper oxygenation of the blood is an indispensable adjunct to the resuscitation of an animal.

4. The heart usually continues to beat for some minutes after it ceases to affect a mercury manometer; the resuscitation of it within this period by extrathoracic massage and artificial respiration is sometimes successful.

5. Resuscitation of the heart by direct massage is the most certain method at our command.

6. A proper blood pressure is an indispensable condition for the continued normal activity of the heart.

7. Anæsthetics, hæmorrhages, and induced currents applied to the heart render resuscitation more difficult than asphyxia alone. GEORGE E. BEILBY.

Experimental Studies in Healing of Brain Tissue Following Aseptic Surgery. GUIDO SALA, M. D.

These experiments were carried out on cats and dogs. Aseptic incisions through cerebral tissue were made; the animals killed on the 2nd, 5th, and 14th days and the tissues in the immediate vicinity of the incisions hardened in ammoniated alcohol, then stained with Roman-y-Cajal's silver nitrate stain.

(1) In the two-day old section, the line of cleavage was found to be filled in by blood cells; a few nerve

fibers appeared agglutinated but not united; a large number of round, oval, or diamond shaped cells lined the margins of the incisions.

(2) In the five-day old section were found numerous round and fusiform nerve roots, with a granular protoplasm and large nucleus. Intermingled with the blood cells were nerve fibrillæ either isolated or in bundles.

(3) In the fourteen-day old section the cicatrix was in good part occupied by bundles of nerve fibrillæ which united and divided to form plexuses. Around the capillaries the fibers appeared more numerous and striated; a few of them had bulbous endings. Groups of 15 to 30 round, oval, or pear shaped nerve roots were found along the margins of the incisions.

Guido Sala believes that these experiments may denote regenerative processes of brain tissue.

GEO. DE TARNOWSKY.

Case of Banti's Disease with Marked Leucopenia.

Dr. Maurice Ascoli exhibited a female patient 50 years old, with the classical triad of splenomegaly, chronic anæmia and leucopenia of 900 W. B. C. per cmm. GEO. DE TARNOWSKY.

Late Results of Whitehead's Operation for Hæmorrhoids. (Résultats éloignés du traitement des hæmorrhoides, par le procédé de Whitehead.) C. COURCIÈRES. *Archives générales de Chirurgie*, March, 1908.

Whitehead's operation, as well as its various modifications, is a treatment best adapted to voluminous hæmorrhoids, internal or external, when they occupy the periphery of the anus, especially if the patient's general health be much affected by them. Whitehead's operation is especially indicated if we have the combined type of hæmorrhoids, that is if we have both internal and external hæmorrhoids. The operation has been undeservedly condemned because of atony of the sphincter which will only be temporary if the pre-operative and post-operative rules have been followed. Whitehead's operation suppresses the entirety of the diseased mucosa and can not be followed by recurrences. The patients operated by this method are and remain cured. The late results of the operation are as satisfactory as the immediate results. Often, were we not informed that the patients had been operated on by this method, we would not believe that they had been subjected to intervention. We must reserve the methods of partial excision, ignipuncture, etc., for cases of isolated hæmorrhoids where they can be easily pedunculated..

AIMÉ PAUL HEINECK.

Abdominoperineal Amputation of the Cancerous Rectum. A Study of 12 Personal Cases. (De l'amputation abdominopérinéale du rectum cancéreux. Etude sur 12 cas personnels.) M. H. RONCHET. *Archives générales de Chirurgie*, March, 1908.

Many are the operative procedures that have been successively proposed and rejected for cancer of the rectum. The operative difficulties, mortality, and recurrences explain this evolution. Many surgeons advise different operative procedures. The wisest are Eclectic and employ at times the perineal route, at times the sacral route and at times the abdominoperineal route. It is this last method that the author advises, basing his opinion upon 12 personal cases. He goes so far as to propose it for all cases whatsoever may be the situation of the cancer, be it anal, rectal, or rectosigmoidal. Abdominoperineal amputation of the rectum has been subjected to many criticisms, the principal of which are its gravity, its complexity and the infirmity incident to a permanent iliac anus. The gravity is real and although the author has been able to obtain 11 cures out of 12 cases, we believe that it is the operator rather than the method which should be congratulated. The 11 cases concerned women. Only one man was operated and died. This confirms once more the gravity of this operation when applied to individuals of the masculine gender, and its relative benignancy in females. As to the complexity of the operation, to dextrous surgeons this will not be a deterrent. The artificial anus is a drawback but can be endured. With care, its inconveniences can be minimized. AIMÉ PAUL HEINECK.

The Technique and Value of Tendon Transplantation in Infantile Paralysis. BY PROF. DR. VELPIUS. *Deutsche Medizinische Wochenschrift*, January 23, 1908.

Velpius reviews the results of tendon transplantation for infantile paralysis and urges a more extensive employment of the operation. He emphasizes the fact that a selection of cases is absolutely necessary and that harm may be done when the operation is performed too early. Two points, he states, should be kept constantly in mind. 1. Early operations are usually a failure. At least one year should elapse after the onset of the poliomyelitis before operation is undertaken. 2. Muscles in bad condition, even if not paralyzed should not be used for transplantation. Failure to obtain results sometimes follows from a lack of care in planning the operation, especially with regard to the choice of muscle to be transplanted on to the paralyzed muscle. In children he considers that observation of active movements and the appearance of the muscles at operation give far more valuable information than electrical reactions. He prefers not to use the whole of a healthy muscle for the transplantation and in his experience antagonistic muscles answer well when no similar muscle is available. With regard to results he states that the function of the paralyzed muscle can be completely restored after the transplantation. In certain cases where the restoration of function is not permanent he believes the reason lies either in the improper selection of cases, an ill-planned operation, or faulty after-treatment. The author has found recurrence more common in poor patients than the well-to-do from the fact that a satisfactory after-treatment could not be carried out for the poorer classes. In his better class of patients his results have been eminently satisfactory. GEORGE E. BEILBY.

BOOK REVIEWS

STUDIES FROM THE LABORATORY FOR SURGICAL RESEARCH. Department of Surgery, Columbia University, Volume 1, 1907.

This small volume is a collection of reprints of articles that have emanated from the Laboratory of Surgical Research of the Columbia University. Each of the articles is of great value, and the desire to maintain them in complete form is a commendable one.

Among the articles it contains are:

1. Studies in Intestinal Exclusion. By Jos. A. Blake, M. D., and R. M. Brown, M. D.

2. Are the Intestines Able to Propel their Contents in an Anti-Peristaltic Direction? By Edwin Beer, M. D., and Carl Eggers, M. D.

5. Studies upon the Function of the Pylorus and Stoma after Gastroenterostomy has been Performed. By Noel Bleecker Leggett, M. D., and J. W. Draper Maury, M. D.

10. The Twine Triangular Stitch for Gastroenterostomy and Enteroenterostomy. By J. W. Draper Maury, M. D.

11. Tetany Parathyreopriva: A Case Report with a Brief Discussion of the Disease and of the Parathyroid Glands. By Eugene H. Pool, M. D.

12. Observations upon a Form of Exophthalmic Goitre Occurring in a Dog. By Carl Eggers, M. D. and J. W. Draper Maury, M. D.

13. The Positive-Pressure Method of Artificial Respiration with a Practical Device for its Application in Thoracic Surgery. By Nathan W. Green, M. D.

15. Rectal Anæsthesia Experiment Studies together with a Report of its Practical Employment at Roosevelt Hospital. By Noel Bleecker Leggett, M. D.

ADENOMYOMA OF THE UTERUS. By Thomas Stephen Cullen, Associate Professor of Gynecology in the Johns Hopkins University, Associate in Gynecology in the Johns Hopkins Hospital. Philadelphia and London: W. B. Saunders Company, 1908.

The author of this work, already well known for his thorough investigations in the pathology of the female pelvis, again presents to the profession a monograph, worthy of his reputation, and of his school.

It is characterized by the same systematic and careful elaboration of facts and observation which was the distinguishing feature of his book on cancer of the uterus. It is a faithful record of long continued investigations, extending over a period of fourteen years, and must be regarded as preeminently authoritative.

The earliest recognition and description of adenomyoma of the uterus, generally attributed to a German worker, dates back to the year 1894, when Dr. Cullen examined a specimen obtained in the operating room at Johns Hopkins, an account of which was published in 1895.

Von Recklinghausen published his book in 1896 and his views regarding the value and origin of these new growths, while arousing some discussion, were widely accepted as correct. He believed that in the great majority of cases the adenomatous elements in the tumors were derived from Wolffian remains. Cullen's serial sections of more than ninety specimens have clearly demonstrated that the glands arise from outward extensions of the normal uterine mucosa, even though found far removed from the latter. In many instances the epithelium is altered or the gland distended to form cysts, so that unless many serial sections are studied, these transition forms may be misinterpreted.

The author claims that the diffuse adenomyoma has a fairly definite clinical history which makes it possible to establish a diagnosis in the great majority of cases, viz., lengthened menstruation, dull, aching, or grinding pains in the uterus during the periods, or as well in the back and thighs. The increased hæmorrhage is due to the participation of the ramifications of the mucosa in the menstrual function, the pain being due to the retention of blood in the gland spaces. There is usually no intermenstrual discharge. Contrary to the findings of W. A. Freund, Cullen states that neither sterility nor an infantile condition of the uterus is a prominent feature. J. CLARENCE WEBSTER.

DISEASES OF CHILDREN FOR NURSES. By Robert S. McCombs, M. D., Asst. Dispensary Physician and Instructor of Nurses at Children's Hospital, Philadelphia. Pp. 418, Cloth. Philadelphia: W. B. Saunders Co., 1907.

This work seems complete, giving first, the peculiarities of disease, then points on the nursing and care of children.

Then follows a more general description of the diseases which affect children, especially the infectious and contagious diseases. The practical points on therapeutics are good and full.

Much space is devoted to the subject of infant feeding, always important in such a work. One wonders, though, why the author should use complicated fractions and algebraic formulæ to explain the percentage method of feeding to nurses when so few physicians, even, understand or practice the system.

Nurses, also, should know that there are other methods of feeding babies, equally as good if not better than the percentage method. Then, too, nothing is said of so important a thing as how much to feed an infant or how often.

In a book for nurses it is questionable whether such rare conditions as noma, ranula, floating kidney, etc., need be described.

We think more emphasis should have been put on the subject of adenoid hypertrophy, enlarged tonsils, and their treatment.

On the whole the book is well printed, readable, and should be valuable to nurses.

HENRY W. CHENEY.

HERMAPHRODITISMUS BEIM MENSCHEN. Von Franz Ludwig von Neugebauer, Vorstand der Gynækologischen Abteilung des Evangelischen Hospitals in Warschau. Leipzig: Verlag von Doctor Werner Klinkhardt.

This large volume of 748 pages, containing 346 illustrations, is one of the most remarkable examples of exhaustive compilation published in recent times.

There is a short introductory account, chiefly of historical interest, followed by a minute consideration of the embryological aspects of hermaphroditism, the various peculiarities being shown to arise in disturbed embryogenesis and organogenesis, as in other teratological conditions, though the primary causes are not known.

The greater part of the volume, about 550 pages, is occupied with summaries of 1891 reports of cases, a collection which will be of the greatest value to all future workers. In addition the author considers various subjects of great interest e.g., hermaphroditism in relation to normal and abnormal sexual feelings, in relation to insanity, suicide, and society, the co-existence of tumors, tuberculosis, and other deformities, legal considerations, etc.

In discussing the various types of hermaphrodites hitherto described, it is clearly pointed out that the great majority are not essentially bisexual i. e., do not possess both ovarian and testicular tissue. Only five genuine cases are known in which careful microscropic examination revealed both structures. But Neugebauer does not consider that even these findings warrant the use of the term "true hermaphrodite" because both tissues are not proved to be at the same time functionally active. Indeed, it may be confidently asserted that no case has been demonstrated in which the male and female organs have existed in one individual, each possessing normal functions.

J. CLARENCE WEBSTER.

BOOKS RECEIVED

DISEASES OF THE RECTUM, ANUS, AND SIGMOID COLON. By F. Swinford Edwards, F. R. C. S. London: J. & A. Churchill; Philadelphia: P. Blakiston's Son & Co., 1908.

CONTRIBUTIONS TO THE STUDY OF THE EARLY DEVELOPMENT AND IMBEDDING OF THE HUMAN OVUM. By Thomas H. Bryce, M. A., M. D., John H. Teacher, M. A., M. D., and John M. Munroe Kerr, M. B. Glasgow: James Maclehose and Sons, 1908.

MEDICAL GYNECOLOGY. By S. Wyllis Bandler, M. D. Philadelphia and London: W. B. Saunders Company, 1908. Cloth, $5.00 net; Half Morocco, $6.50 net.

PULMONARY TUBERCULOSIS AND ITS COMPLICATIONS. By Sherman G. Bonney, M. D. Philadelphia and London: W. B. Saunders Company, 1908. Cloth, $7.00 net; Half Morocco, $8.50 net.